HP ProLiant DL980 G7 Server User Guide

Abstract

This document is for the person who installs, administers, and troubleshoots servers and storage systems. HP assumes you are qualified in the servicing of computer equipment and trained in recognizing hazards in products with hazardous energy levels.

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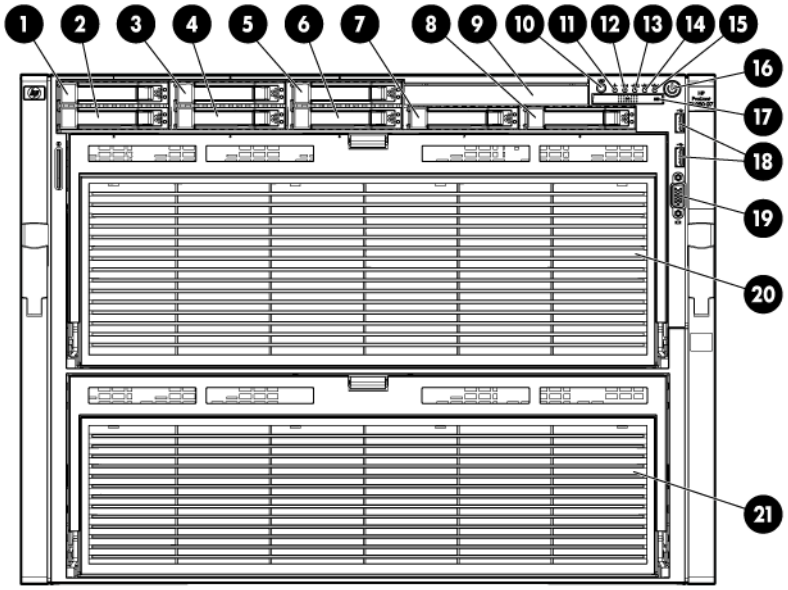
Server component identification

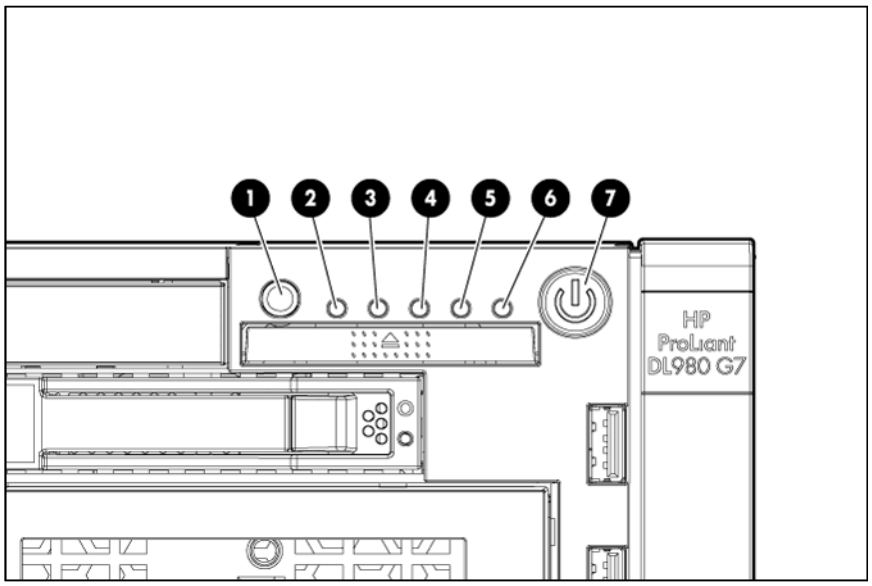
Front panel components



Item	Description
1	Hard drive bay 1
2	Hard drive bay 2
3	Hard drive bay 3
4	Hard drive bay 4
5	Hard drive bay 5
6	Hard drive bay 6
7	Hard drive bay 7
8	Hard drive bay 8
9	Optical drive bay
10	UID button and LED
11	Health LED
12	NIC 1 LED
13	NIC 2 LED
14	NIC 3 LED
15	NIC 4 LED
16	Power on/Standby button and LED
17	SID
18	USB connectors
19	Video connector

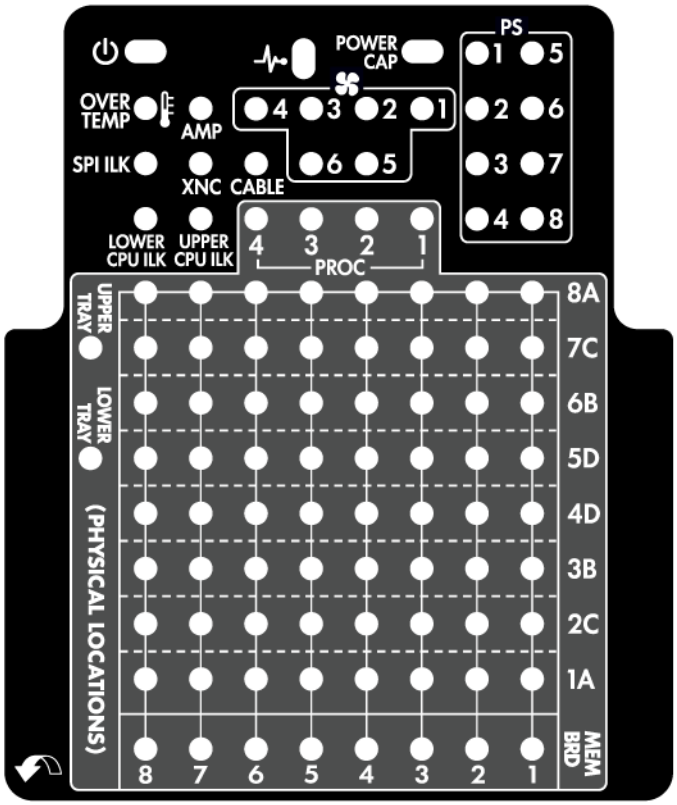
Item	Description
20	Processor memory tray (upper)
21	Processor memory tray (lower)

Front panel LEDs



Item	Description	Status
1	UID button and LED	Blue—Activated Blue (flashing)—Server being managed remotely Off—Deactivated
2	Health LED	Green—Normal (system on) Amber (flashing)—Internal system health degraded Red (flashing)—Internal system health critical Off—Normal (system off)
3	NIC 1 LED	Green—Linked to network Green (flashing)—Linked with activity on the network Off—No network connection
4	NIC 2 LED	Green—Linked to network Green (flashing)—Linked with activity on the network Off—No network connection
5	NIC 3 LED	Green—Linked to network Green (flashing)—Linked with activity on the network Off—No network connection
6	NIC 4 LED	Green—Linked to network Green (flashing)—Linked with activity on the network Off—No network connection
7	Power on/Standby button and LED	Amber—System has AC power and is in standby mode. Green—System has AC power and is powered on. Off—System has no AC power.

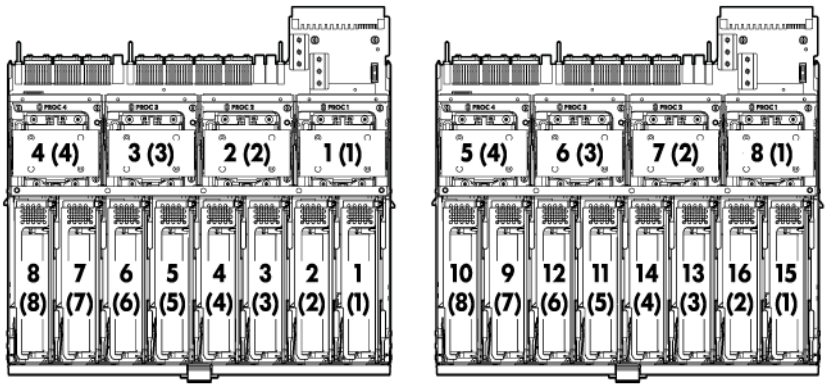
System Insight Display LEDs



LED	Component
POWER	System power
EXT HEALTH	External component health
POWER CAP	Powering capping
OVER TEMP	Over temperature
AMP	Advanced memory protection
PS X	Power supply
FAN X	Fan
SPI ILK	SPI board not properly seated
XNC	XNC board not properly seated
CABLE	XNC J-Link cables or management cable
LOWER CPU INK	Lower processor memory drawer not fully seated
UPPER CPU ILK	Upper processor memory drawer not fully seated
PROC X	Processor
UPPER CPU	Indicates upper CPU tray with associated CPUs, memory risers and DIMMs

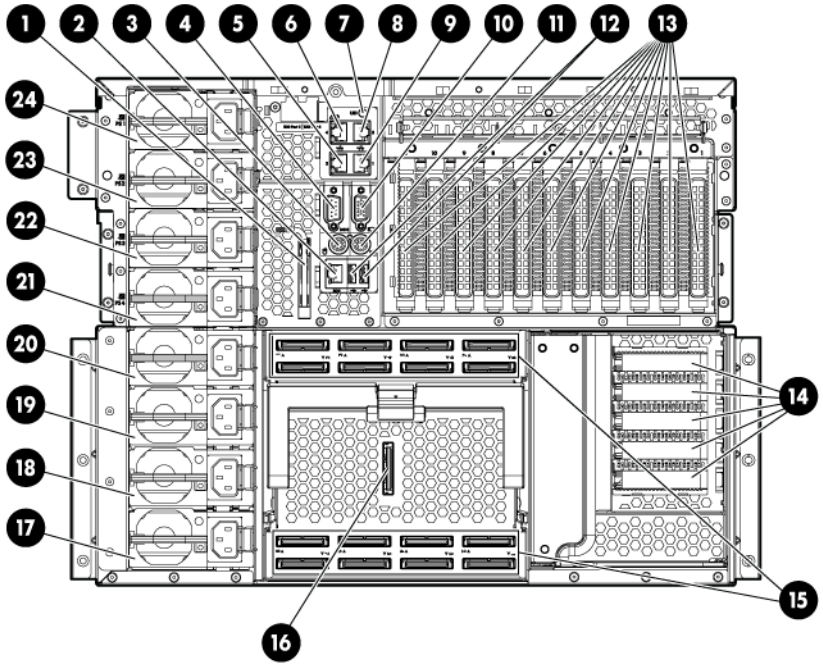
LED	Component
LOWER CPU	Indicates lower CPU tray with associated CPUs, memory risers and DIMMs
MEMORY BOARD X DIMM 1A-8D	DIMM slot

Processor and memory board configuration / logical (physical) location



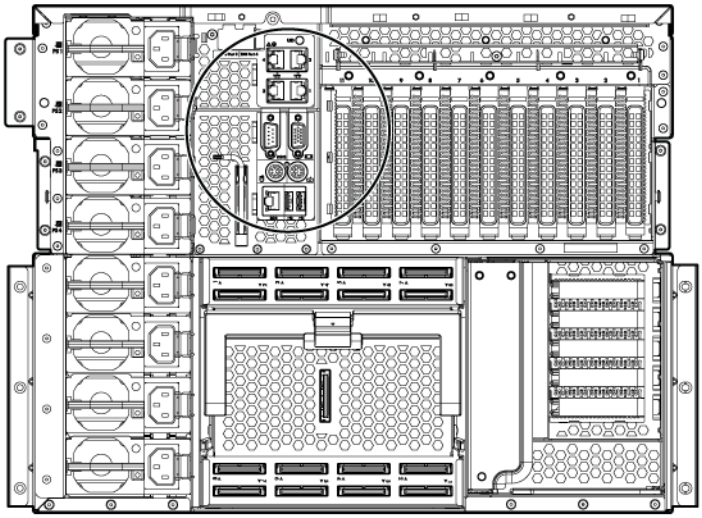
Upper processor memory board is shown on the left. Lower processor memory board is shown on the right.

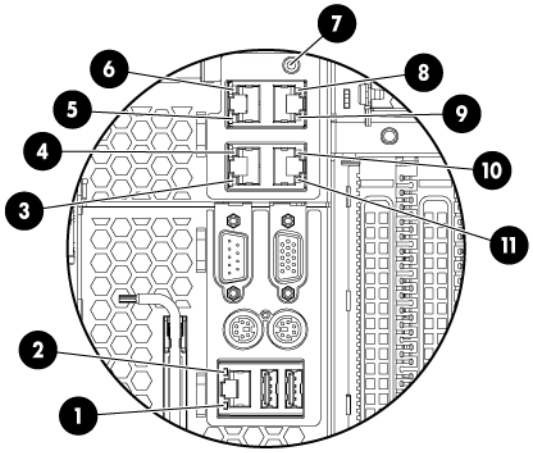
Rear panel components



Item	Description
1	Torx T-15 Tool
2	iLO 3 connector
3	Mouse connector
4	Serial connector
5	NIC connector 2
6	NIC connector 4
7	UID
8	NIC connector 3
9	NIC connector 1
10	Video connector
11	Keyboard connector
12	USB connectors
13	I/O expansion slots
14	Small form factor I/O expansion slots (optional)
15	XNC connectors
16	XNC management connector
17	Power supply 8
18	Power supply 7
19	Power supply 6
20	Power supply 5
21	Power supply 4
22	Power supply 3
23	Power supply 2
24	Power supply 1

Rear panel LEDs

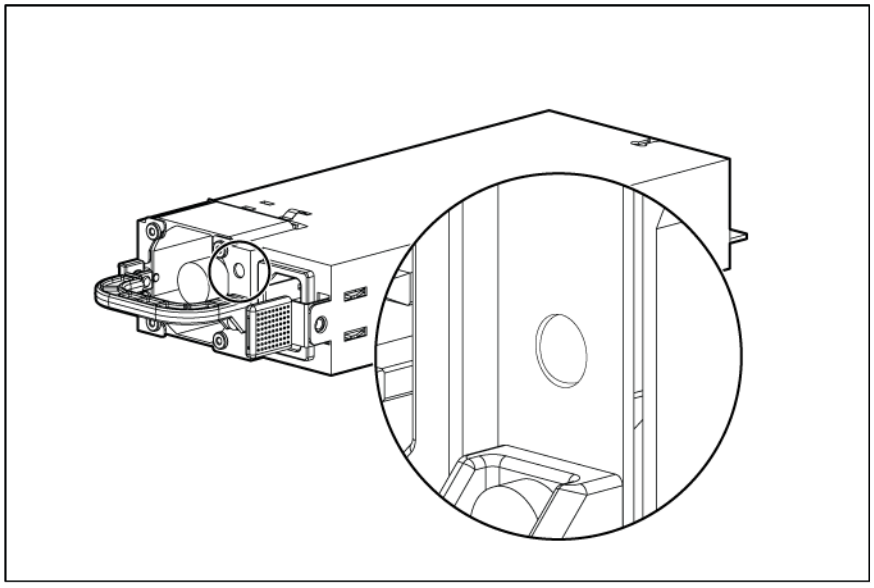




Item	Description	LED color	Status
1	iLO 3 NIC Activity LED	Green	On or flashing—Network activity Off—No network activity
2	iLO 3 NIC Link LED	Green	On—Linked to network Off—Not linked to network
3	NIC 2 Activity LED	Green	On or flashing—Network activity Off—No network activity
4	NIC 2 Link LED	Green	On—Linked to network Off—Not linked to network
5	NIC 4 Activity LED	Green	On or flashing—Network activity Off—No network activity
6	NIC 4 Link LED	Green	On—Linked to network Off—Not linked to network
7	UID LED	Blue	On—UID active Off—UID inactive
8	NIC 3 Link LED	Green	On—Linked to network Off—Not linked to network

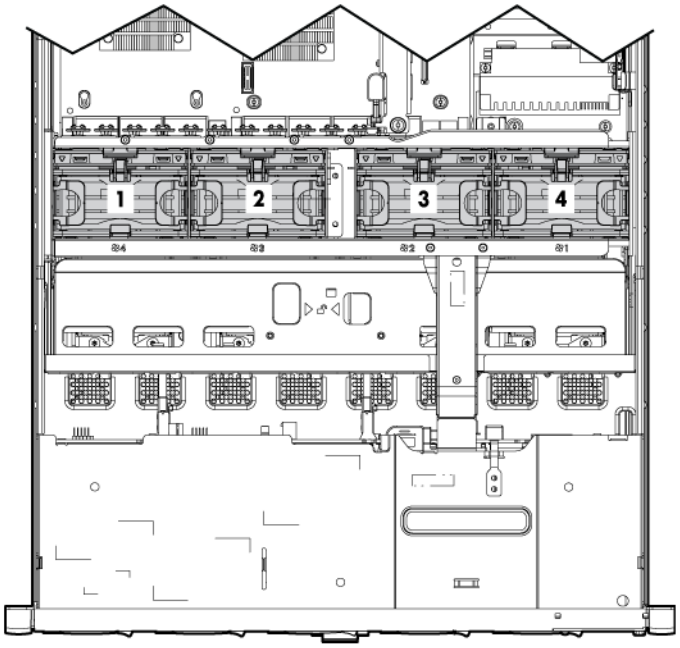
Item	Description	LED color	Status
9	NIC 3 Activity LED	Green	On or flashing—Network activity Off—No network activity
10	NIC 1 Link LED	Green	On—Linked to network Off—Not linked to network
11	NIC 1 Activity LED	Green	On or flashing—Network activity Off—No network activity

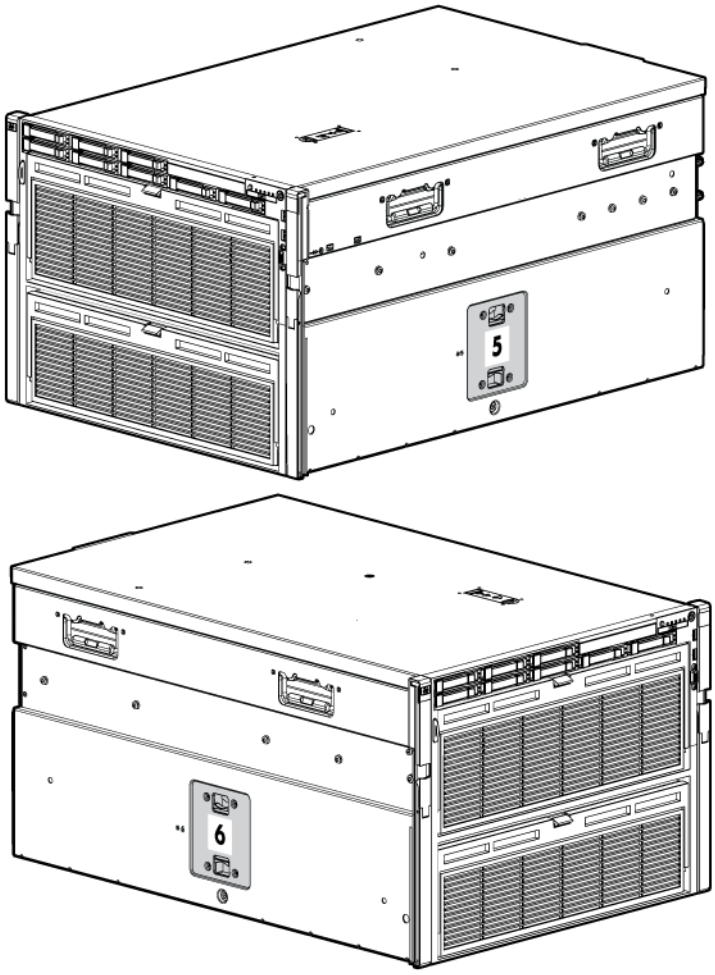
Power supply LED



Power LED	Status
Off	No AC power to power supply units
Green	AC is present. Standby output is on, output is disabled.
Green	AC is present. Standby output is on, power supply DC output is on and OK.
Off	Power supply failure (includes overvoltage and overtemperature)

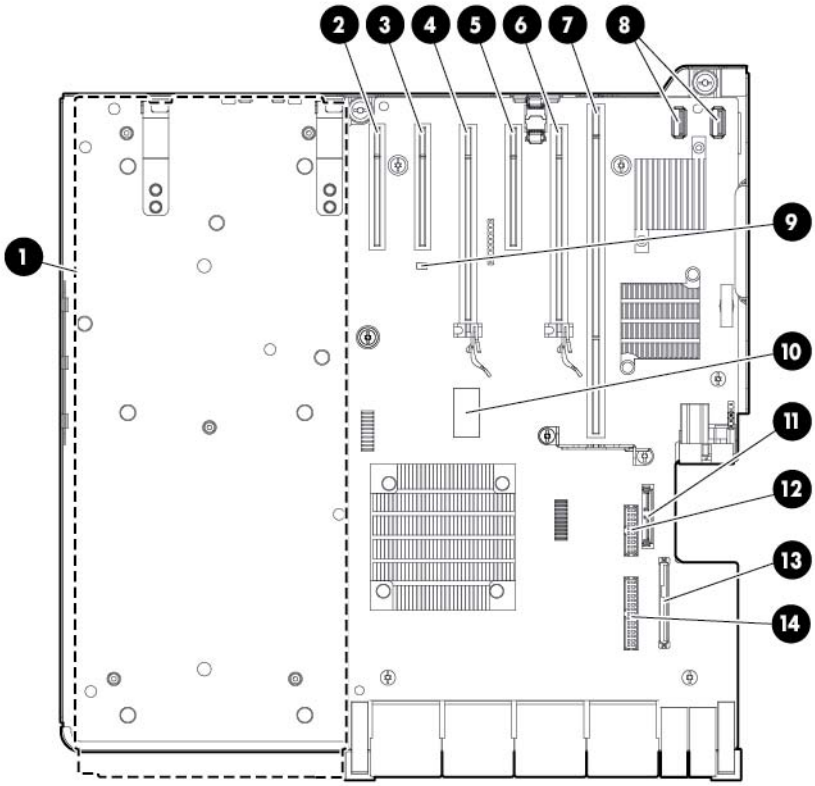
Fan location



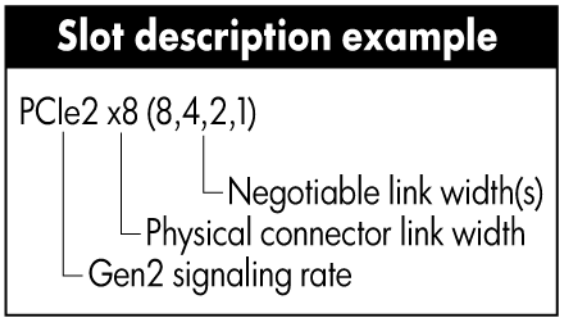


Item	Description
1	Fan 4
2	Fan 3
3	Fan 2
4	Fan 1
5	Fan module 6
6	Fan module 5

System board components



Item	Description
1	Optional I/O expansion board connectors: • PCI-X/PCI Express I/O expansion board • PCI Express I/O expansion board
2	Slot 7 PCIe2 x8 (4, 2, 1)
3	Slot 8 PCIe2 x8 (4, 2, 1)
4	Slot 9 PCIe2 x16 (8, 4, 2, 1)
5	Slot 10 PCIe2 x8 (4, 2, 1)
6	Slot 11 PCIe2 x8 (8, 4, 2, 1)
7	SPI board connector
8	Internal USB connectors (2)
9	NMI jumper
10	System maintenance switch
11	Optical drive connector
12	Video/USB connector
13	Solid state drive connector
14	Power button/UID connector



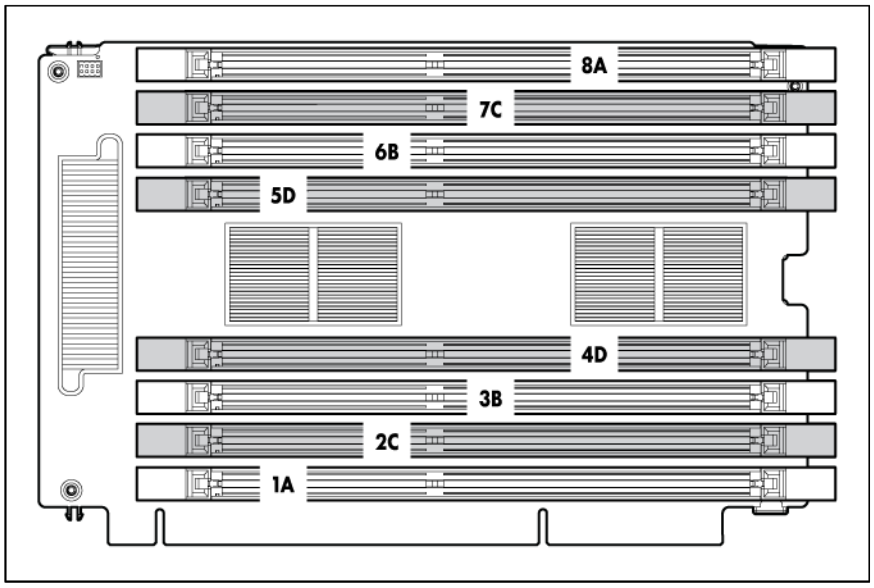
System maintenance switch

The system maintenance switch (SW1) is an eight-position switch that is used for system configuration. The default position for all eight positions is Off.

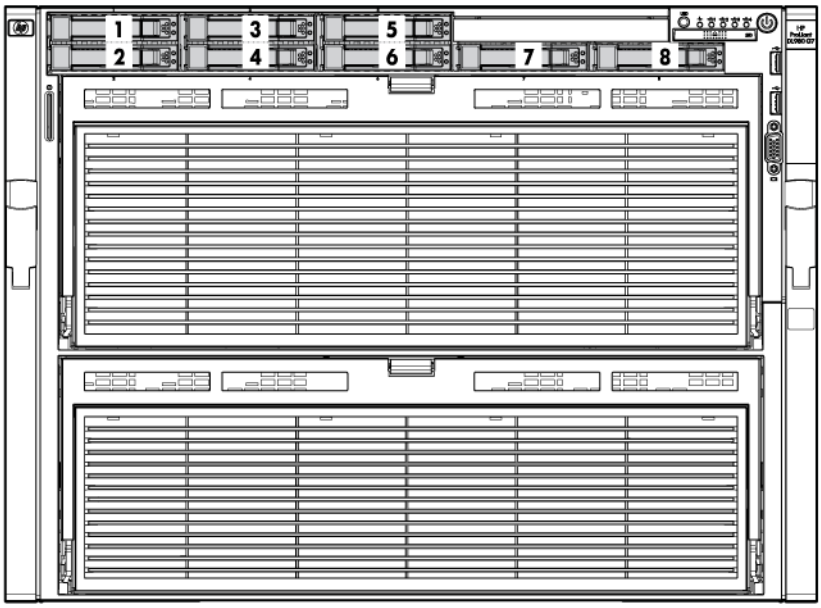
Position	Description	Function
S1	iLO 3 security	Off = iLO 3 security is enabled. On = iLO 3 security is disabled.
S2	Configuration lock	Off = System configuration can be changed. On = System configuration is locked.
S3	Reserved	Reserved
S4	Reserved	Reserved
S5	Password protection override	Off = No function On = Clears power-on password and administrator password
S6	Invalidate configuration	Off = Normal On = Clears NVRAM
S7	Reserved	Reserved
S8	Reserved	Reserved

DIMM slot locations

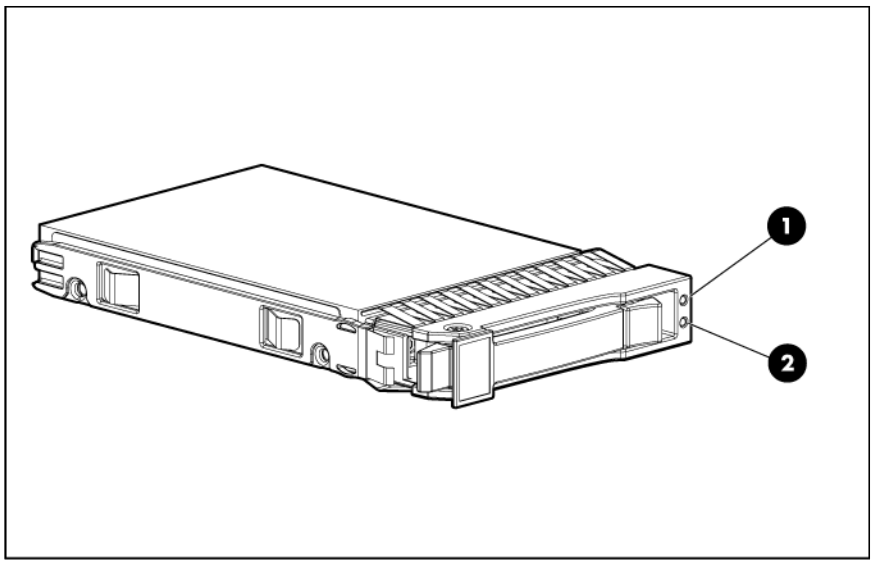
Each memory module contains 8 DIMM slots. The paired banks are identified by the letters A through D.



Device numbers



SAS hard drive LEDs



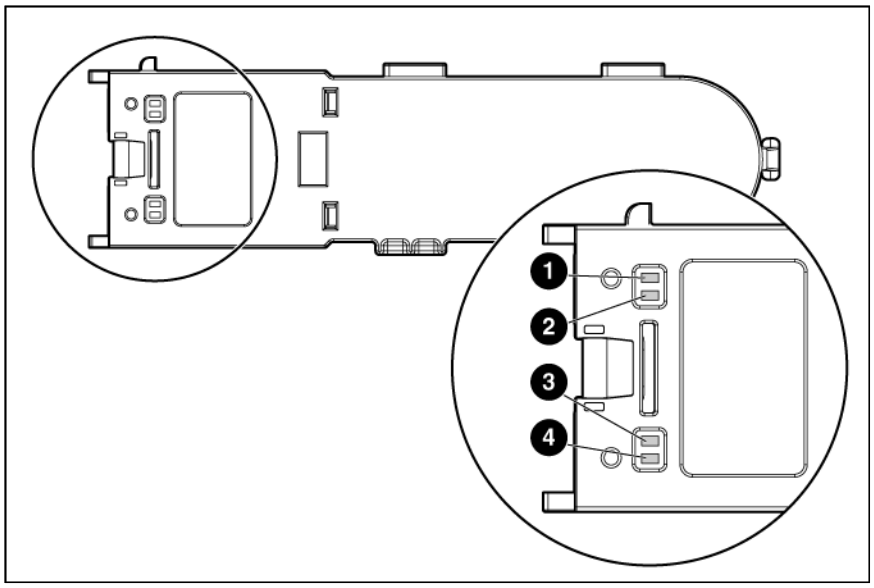
Item	Description
1	Fault/UID LED (amber/blue)
2	Online LED (green)

SAS hard drive LED combinations

Online/activity LED (green)	Fault/UID LED (amber/blue)	Interpretation
On, off, or flashing	Alternating amber and blue	The drive has failed, or a predictive failure alert has been received for this drive; it also has been selected by a management application.
On, off, or flashing	Steadily blue	The drive is operating normally, and it has been selected by a management application.
On	Amber, flashing regularly (1 Hz)	A predictive failure alert has been received for this drive. Replace the drive as soon as possible.
On	Off	The drive is online, but it is not active currently.
Flashing regularly (1 Hz)	Amber, flashing regularly (1 Hz)	**Do not remove the drive. Removing a drive may terminate the current operation and cause data loss.** The drive is part of an array that is undergoing capacity expansion or stripe migration, but a predictive failure alert has been received for this drive. To minimize the risk of data loss, do not replace the drive until the expansion or migration is complete.
Flashing regularly (1 Hz)	Off	**Do not remove the drive. Removing a drive may terminate the current operation and cause data loss.** The drive is rebuilding, or it is part of an array that is undergoing capacity expansion or stripe migration.
Flashing irregularly	Amber, flashing regularly (1 Hz)	The drive is active, but a predictive failure alert has been received for this drive. Replace the drive as soon as possible.
Flashing irregularly	Off	The drive is active, and it is operating normally.

Online/activity LED (green)	Fault/UID LED (amber/blue)	Interpretation
Off	Steadily amber	A critical fault condition has been identified for this drive, and the controller has placed it offline. Replace the drive as soon as possible.
Off	Amber, flashing regularly (1 Hz)	A predictive failure alert has been received for this drive. Replace the drive as soon as possible.
Off	Off	The drive is offline, a spare, or not configured as part of an array.

Battery pack LEDs



Item ID	Color	Description
1	Green	System Power LED. This LED glows steadily when the system is powered up and 12 V system power is available. This power supply is used to maintain the battery charge and provide supplementary power to the cache microcontroller.
2	Green	Auxiliary Power LED. This LED glows steadily when 3.3V auxiliary voltage is detected. The auxiliary voltage is used to preserve BBWC data and is available any time that the system power cords are connected to a power supply.
3	Amber	Battery Health LED. To interpret the illumination patterns of this LED, see the following table.
4	Green	BBWC Status LED. To interpret the illumination patterns of this LED, see the following table.

LED3 pattern	LED4 pattern	Interpretation
—	One blink every two seconds	The system is powered down, and the cache contains data that has not yet been written to the drives. Restore system power as soon as possible to prevent data loss. Data preservation time is extended any time that 3.3 V auxiliary power is available, as indicated by LED 2. In the absence of auxiliary power, battery power alone preserves the data. A fully-charged battery can normally preserve data for at least two days. The battery lifetime also depends on the cache module size. For further information, refer to the controller QuickSpecs on the HP website (http://www.hp.com).
—	Double blink, then pause	The cache microcontroller is waiting for the host controller to communicate.
—	One blink per second	The battery pack is below the minimum charge level and is being charged. Features that require a battery (such as write cache, capacity expansion, stripe size migration, and RAID migration) are temporarily unavailable until charging is complete. The recharge process takes between 15 minutes and two hours, depending on the initial capacity of the battery.
—	Steady glow	The battery pack is fully charged, and posted write data is stored in the cache.
—	Off	The battery pack is fully charged, and there is no posted write data in the cache.
One blink per second	One blink per second	An alternating green and amber blink pattern indicates that the cache microcontroller is executing from within its boot loader and receiving new flash code from the host controller.
Steady glow	—	There is a short circuit across the battery terminals or within the battery pack. BBWC features are disabled until the battery pack is replaced. The life expectancy of a battery pack is typically more than three years.
One blink per second	—	There is an open circuit across the battery terminals or within the battery pack. BBWC features are disabled until the battery pack is replaced. The life expectancy of a battery pack is typically more than three years.

Operations

Power up the server

To power up the server, press the Power On/Standby button.

Power down the server

WARNING: To reduce the risk of personal injury, electric shock, or damage to the equipment, remove the power cord to remove power from the server. The front panel Power On/Standby button does not completely shut off system power. Portions of the power supply and some internal circuitry remain active until AC power is removed.

IMPORTANT: If installing a hot-plug device, it is not necessary to power down the server.

1. Back up the server data.
2. Shut down the operating system as directed by the operating system documentation.

   NOTE: If the operating system automatically places the server in Standby mode, omit the next step.

3. Press the Power On/Standby button to place the server in Standby mode. When the server activates Standby power mode, the system power LED changes to amber.

   IMPORTANT: Pressing the UID button illuminates the blue UID LEDs on the front and rear panels. In a rack environment, this feature facilitates locating a server when moving between the front and rear of the rack.

4. Disconnect the power cords.

The system is now without power.

Extend the server from the rack

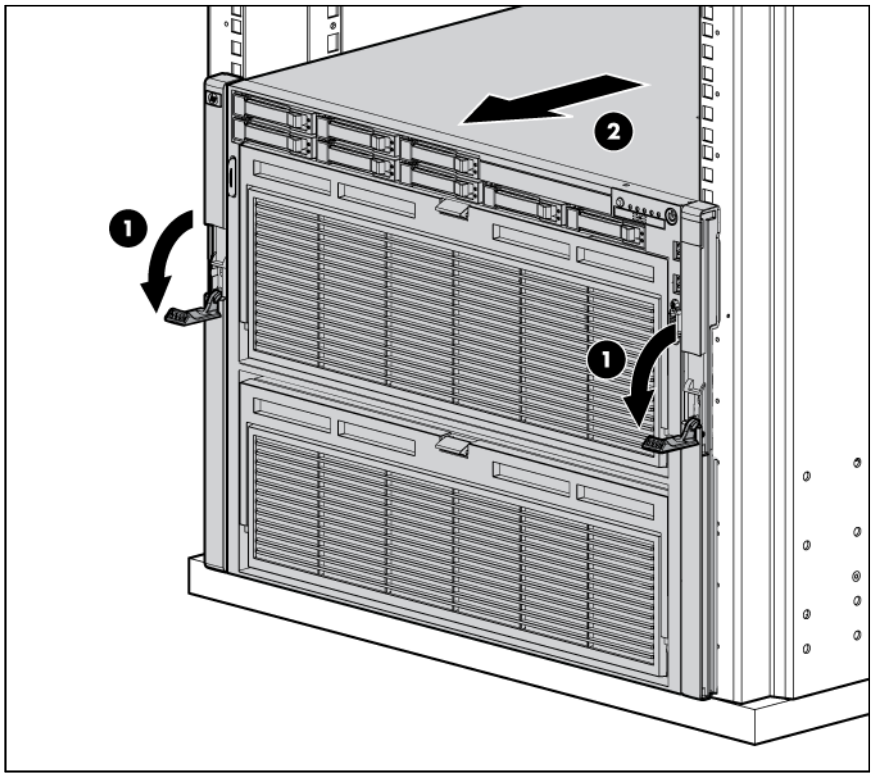
WARNING: To reduce the risk of personal injury or equipment damage, be sure that the rack is adequately stabilized before extending a component from the rack.

WARNING: To reduce the risk of personal injury, be careful when pressing the server rail-release latches and sliding the server into the rack. The sliding rails could pinch your fingers.

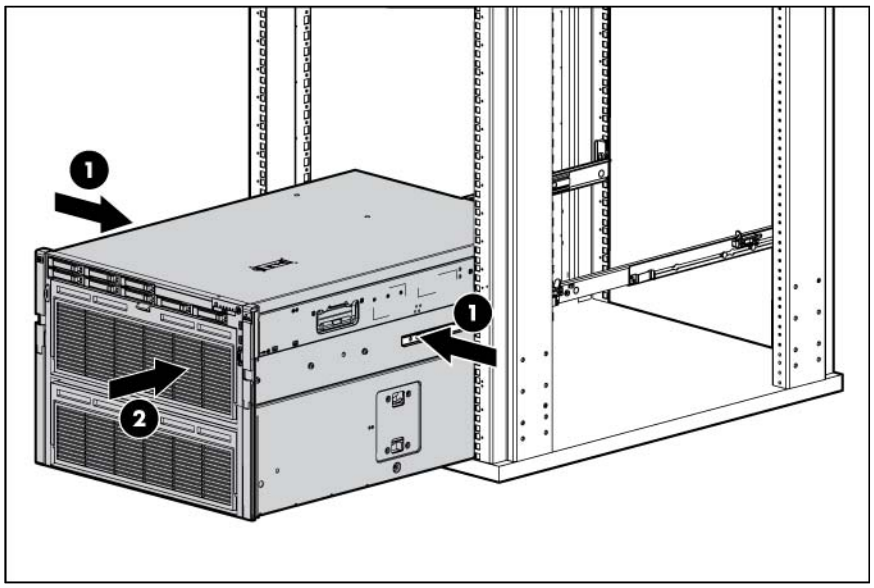
To extend the server from the rack:

1. Pull down the quick-release levers on each side of the server to release the server from the rack.

2. Extend the server on the rack rails until the server rail-release latches engage.



3. After performing the installation or maintenance procedure, slide the server into the rack by pressing the server rail-release latches.



Remove the access panel

⚠ **WARNING:** To reduce the risk of personal injury from hot surfaces, allow the drives and the internal system components to cool before touching them.

CAUTION: Do not operate the server for long periods with the access panel open or removed. Operating the server in this manner results in improper airflow and improper cooling that can lead to thermal damage.

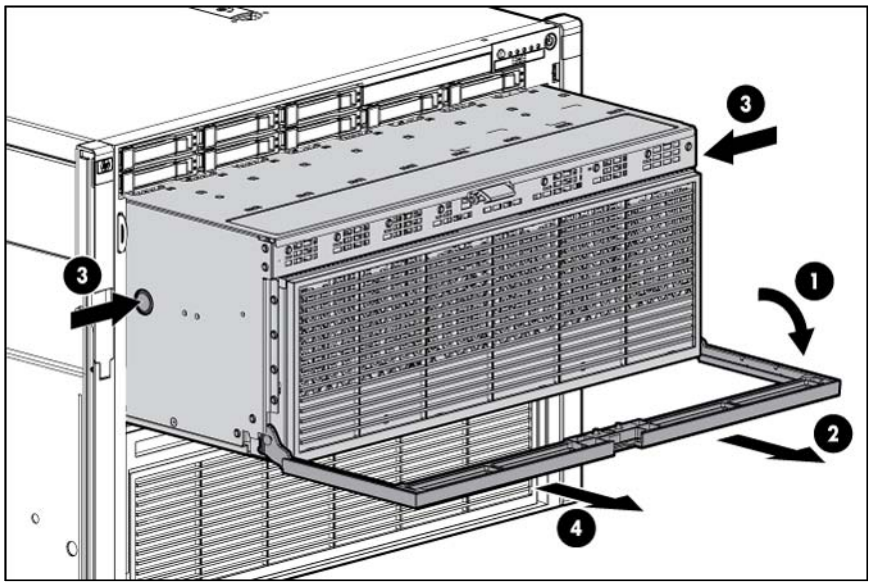
To remove the component:

1. Power down the server (on page 22).
2. Extend the server from the rack (on page 22).
3. Open the locking latch, slide the access panel to the rear of the chassis, and remove the access panel.

   If the locking latch is locked, use a T-15 Torx screwdriver to unlock the latch.

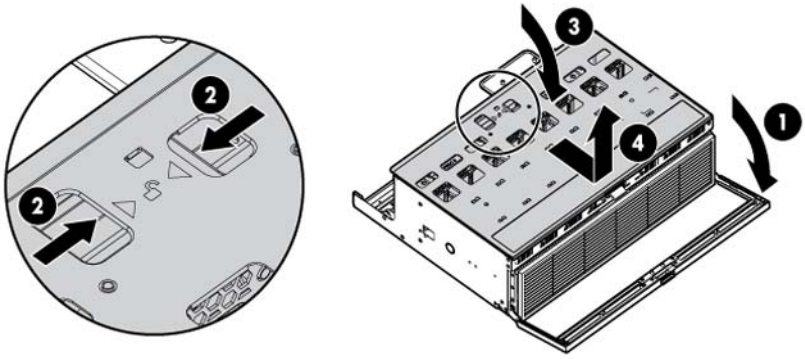
Remove the upper or lower processor memory drawer or processor memory drawer blank

1. Power down the server (on page 22).
2. Release the latches on the release lever.
3. Lower the handle, and then extend the processor memory drawer from the server until the release latches catch.



4. Firmly holding the processor memory drawer, press the release buttons and then remove the drawer from the server.

5. Remove the processor memory drawer cover.



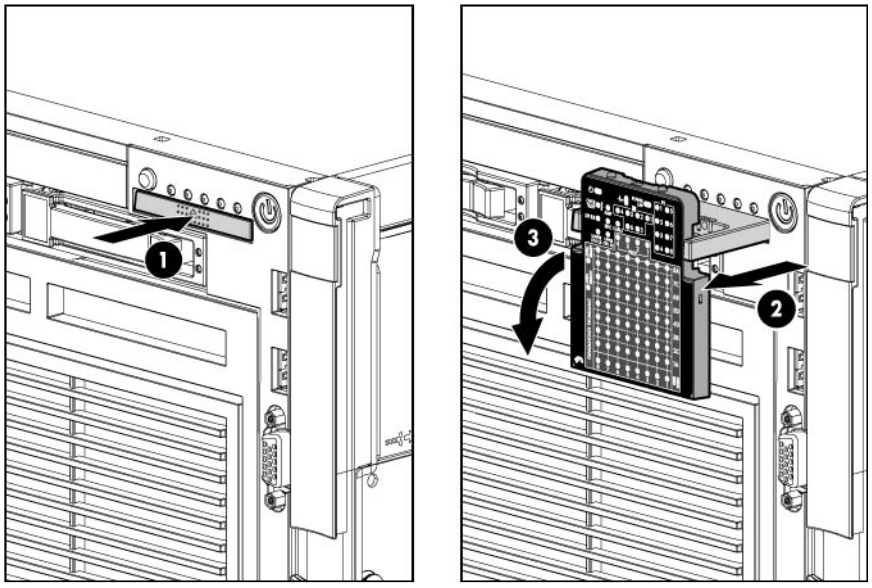
The procedure is the same for the upper and lower processor memory drawers, and the processor memory drawer blank.

> **CAUTION:** XNC cabling (on page 74) is required for eight processor systems. Failure to cable the XNC will result in the lower processor memory drawer not being recognized by the server.

Access the Systems Insight Display

To access the Systems Insight Display:

1. Press and release the panel.
2. After the display fully ejects, rotate the display downward to view the LEDs.



Setup

Optional installation services

Delivered by experienced, certified engineers, HP Care Pack services help you keep your servers up and running with support packages tailored specifically for HP ProLiant systems. HP Care Packs let you integrate both hardware and software support into a single package. A number of service level options are available to meet your needs.

HP Care Pack Services offer upgraded service levels to expand your standard product warranty with easy-to-buy, easy-to-use support packages that help you make the most of your server investments. Some of the Care Pack services are:

- Hardware support
  - 6-Hour Call-to-Repair
  - 4-Hour 24x7 Same Day
  - 4-Hour Same Business Day
- Software support
  - Microsoft®
  - Linux
  - HP ProLiant Essentials (HP SIM and RDP)
  - VMWare
- Integrated hardware and software support
  - Critical Service
  - Proactive 24
  - Support Plus
  - Support Plus 24
- Startup and implementation services for both hardware and software

For more information on HP Care Pack Services, see the HP website (http://www.hp.com/services/carepack).

Rack planning resources

The rack resource kit ships with all HP branded or Compaq branded 9000, 10000, and H9 series racks. For more information on the content of each resource, see the rack resource kit documentation.

Optimum environment

When installing the server, select a location that meets the environmental standards described in this section.

Space and airflow requirements

To allow for servicing and adequate airflow, observe the following space and airflow requirements when deciding where to install a rack:

- Leave a minimum clearance of 63.5 cm (25 in) in front of the rack.
- Leave a minimum clearance of 76.2 cm (30 in) behind the rack.
- Leave a minimum clearance of 121.9 cm (48 in) from the back of the rack to the back of another rack or row of racks.

HP servers draw in cool air through the front door and expel warm air through the rear door. Therefore, the front and rear rack doors must be adequately ventilated to allow ambient room air to enter the cabinet, and the rear door must be adequately ventilated to allow the warm air to escape from the cabinet.

△ **CAUTION:** To prevent improper cooling and damage to the equipment, do not block the ventilation openings.

When vertical space in the rack is not filled by a server or rack component, the gaps between the components cause changes in airflow through the rack and across the servers. Cover all gaps with blanking panels to maintain proper airflow.

△ **CAUTION:** Always use blanking panels to fill empty vertical spaces in the rack. This arrangement ensures proper airflow. Using a rack without blanking panels results in improper cooling that can lead to thermal damage.

The 9000 and 10000 Series Racks provide proper server cooling from flow-through perforations in the front and rear doors that provide 64 percent open area for ventilation.

△ **CAUTION:** When using a Compaq branded 7000 Series rack, you must install the high airflow rack door insert [P/N 327281-B21 (42U) or P/N 157847-B21 (22U)] to provide proper front-to-back airflow and cooling.

△ **CAUTION:** If a third-party rack is used, observe the following additional requirements to ensure adequate airflow and to prevent damage to the equipment:

- Front and rear doors—If the 42U rack includes closing front and rear doors, you must allow 5,350 sq cm (830 sq in) of holes evenly distributed from top to bottom to permit adequate airflow (equivalent to the required 64 percent open area for ventilation).
- Side—The clearance between the installed rack component and the side panels of the rack must be a minimum of 7 cm (2.75 in).

Temperature requirements

To ensure continued safe and reliable equipment operation, install or position the system in a well-ventilated, climate-controlled environment.

The maximum recommended ambient operating temperature (TMRA) for most server products is 35°C (95°F). The temperature in the room where the rack is located must not exceed 35°C (95°F).

△ **CAUTION:** To reduce the risk of damage to the equipment when installing third-party options:

- Do not permit optional equipment to impede airflow around the server or to increase the internal rack temperature beyond the maximum allowable limits.
- Do not exceed the manufacturer's TMRA.

Power requirements

Installation of this equipment must comply with local and regional electrical regulations governing the installation of information technology equipment by licensed electricians. This equipment is designed to operate in installations covered by NFPA 70, 1999 Edition (National Electric Code) and NFPA-75, 1992 (code for Protection of Electronic Computer/Data Processing Equipment). For electrical power ratings on options, refer to the product rating label or the user documentation supplied with that option.

⚠ **WARNING:** To reduce the risk of personal injury, fire, or damage to the equipment, do not overload the AC supply branch circuit that provides power to the rack. Consult the electrical authority having jurisdiction over wiring and installation requirements of your facility.

⚠ **CAUTION:** Protect the server from power fluctuations and temporary interruptions with a regulating uninterruptible power supply (UPS). This device protects the hardware from damage caused by power surges and voltage spikes and keeps the system in operation during a power failure.

When installing more than one server, you may need to use additional power distribution devices to safely provide power to all devices. Observe the following guidelines:

- Balance the server power load between available AC supply branch circuits.
- Do not allow the overall system AC current load to exceed 80 percent of the branch circuit AC current rating.
- Do not use common power outlet strips for this equipment.
- Provide a separate electrical circuit for the server.

Electrical grounding requirements

The server must be grounded properly for proper operation and safety. In the United States, you must install the equipment in accordance with NFPA 70, 1999 Edition (National Electric Code), Article 250, as well as any local and regional building codes. In Canada, you must install the equipment in accordance with Canadian Standards Association, CSA C22.1, Canadian Electrical Code. In all other countries, you must install the equipment in accordance with any regional or national electrical wiring codes, such as the International Electrotechnical Commission (IEC) Code 364, parts 1 through 7. Furthermore, you must be sure that all power distribution devices used in the installation, such as branch wiring and receptacles, are listed or certified grounding-type devices.

Because of the high ground-leakage currents associated with multiple servers connected to the same power source, HP recommends the use of a PDU that is either permanently wired to the building's branch circuit or includes a nondetachable cord that is wired to an industrial-style plug. NEMA locking-style plugs or those complying with IEC 60309 are considered suitable for this purpose. Using common power outlet strips for the server is not recommended.

Rack warnings

⚠ **WARNING:** To reduce the risk of personal injury or damage to the equipment, be sure that:

- The leveling jacks are extended to the floor.
- The full weight of the rack rests on the leveling jacks.
- The stabilizing feet are attached to the rack if it is a single-rack installation.
- The racks are coupled together in multiple-rack installations.
- Only one component is extended at a time. A rack may become unstable if more than one component is extended for any reason.

⚠ **WARNING:** To reduce the risk of personal injury or equipment damage when unloading a rack:

- At least two people are needed to safely unload the rack from the pallet. An empty 42U rack can weigh as much as 115 kg (253 lb), can stand more than 2.1 m (7 ft) tall, and may become unstable when being moved on its casters.
- Never stand in front of the rack when it is rolling down the ramp from the pallet. Always handle the rack from both sides.

Identifying the contents of the server shipping carton

Unpack the server shipping carton and locate the materials and documentation necessary for installing the server. All the rack mounting hardware necessary for installing the server into the rack is included with the rack or the server.

The contents of the server shipping carton include:

- Server
- Power cord
- Hardware documentation, Documentation CD, and software products
- Rack-mounting hardware

In addition to the supplied items, you may need:

- Operating system or application software
- Hardware options

Installing hardware options

Install any hardware options before initializing the server. For options installation information, refer to the option documentation. For server-specific information, refer to "Hardware options installation (on page 31)."

Installing the server into the rack

Refer to the installation instructions that ship with the rack kit to install the server into the rack.

Powering up and configuring the server

To power up the server, press the Power On/Standby button.

While the server boots, RBSU and the ORCA utility are automatically configured to prepare the server for operating system installation.

To configure these utilities manually:

- Press the **F8** key when prompted during the array controller initialization to configure the array controller using ORCA.
- Press the **F9** key when prompted during the boot process to change the server settings using RBSU. The system is set up by default for the English language.

For more information on the automatic configuration, refer to the *HP ROM-Based Setup Utility User Guide* located on the Documentation CD.

Installing the operating system

To operate properly, the server must have a supported operating system. For the latest information on supported operating systems, refer to the HP website (http://www.hp.com/go/supportos).

Two methods are available to install an operating system on the server:

- SmartStart assisted installation—Insert the SmartStart CD into the CD-ROM drive and reboot the server.
- Manual installation—Insert the operating system CD into the CD-ROM drive and reboot the server. This process may require you to obtain additional drivers from the HP website (http://www.hp.com/support).

Follow the on-screen instructions to begin the installation process.

For information on using these installation paths, refer to the SmartStart installation poster in the HP ProLiant Essentials Foundation Pack, included with the server.

Registering the server

To register the server, refer to the HP Registration website (http://register.hp.com).

Hardware options installation

Introduction

If more than one option is being installed, read the installation instructions for all the hardware options and identify similar steps to streamline the installation process.

WARNING: To reduce the risk of personal injury from hot surfaces, allow the drives and the internal system components to cool before touching them.

CAUTION: To prevent damage to electrical components, properly ground the server before beginning any installation procedure. Improper grounding can cause electrostatic discharge.

Review "Electrostatic Discharge (on page 116)" before installing hardware options into the server.

Processor options

The server supports only a four or eight processor configuration. Observe the following processor installation guidelines:

- In a four processor configuration, processors 1 through 4 must be located in the upper CPU drawer.
- In an eight processor configuration processors 1 through 4 are located in the upper CPU drawer and processors 5 through 8 are located in the lower CPU drawer.

IMPORTANT: When running SUSE Linux Enterprise Server 10 SP3 on the HP ProLiant DL980 G7 server under high load, the operating system may become unstable, causing the system to eventually halt. SUSE Linux Enterprise Server 10 SP3 supports 32 CPUs and up to 128 CPUs on certified systems. The HP ProLiant DL980 G7 server supports up to 128 CPUs with hyper-threading enabled. The design of scheduling/locking code in the SUSE Linux Enterprise Server 10 SP3 kernel combined with the HP ProLiant DL980 G7 server causes high load tests to eventually lock up the system completely. The vendor certification tests run a high load on the system and have also caused the system to lockup completely. Therefore it is not possible at this time to pass vendor certification for SUSE Linux Enterprise Server 10 SP3 on the HP ProLiant DL980 G7 server.

To ensure SUSE Linux Enterprise Server 10 SP3 does not stop responding under high utilization, upgrade to SUSE Linux Enterprise Server 11 SP1. SUSE Linux Enterprise Server 11 SP1 has passed all vendor certification. As a workaround, in some instances reducing the HP ProLiant DL980 G7 server to fewer CPUs has been found to prevent the server from halting. For example, configure the HP ProLiant DL980 G7 server as a 4P with hyperthreading disabled. Disable processor Hyper-threading via the ROM-Based Setup Utility (RBSU) by performing the following: (Disabling Hyper-threading will cause Multi-threaded applications to not be fully utilized, which will affect performance.)

1. During system boot, press F9 to enter the ROM-Based Setup Utility (RBSU).
2. Select System Options -> Processor Options.
3. Set Intel Hyperthreading Options to "Disabled."

Installing a processor

The processors and memory are located in the drawer accessible from the front of the server. It is not necessary to extend or remove the server from the rack to install or replace processors and memory.

WARNING: Use caution when installing the processor memory module or removing the processor memory module. The processor memory module is very heavy when fully populated.

CAUTION: To help avoid damage to the processor and system board, do not install the processor without using the processor installation tool.

CAUTION: To prevent possible server malfunction and damage to the equipment, multiprocessor configurations must contain processors with the same part number.

IMPORTANT: If installing a processor with a faster speed, update the system ROM before installing the processor.

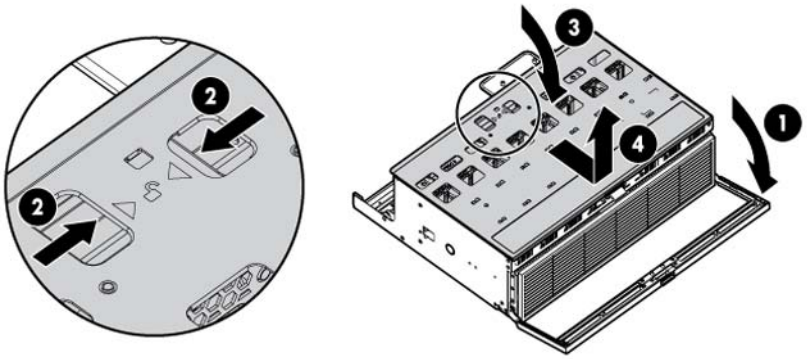
IMPORTANT: If upgrading to an Intel Xeon Processor E7, update the system ROM before installing the processor.

IMPORTANT: When either optional I/O expansion board is installed in a two-processor configuration, the second processor must be installed in socket 3.

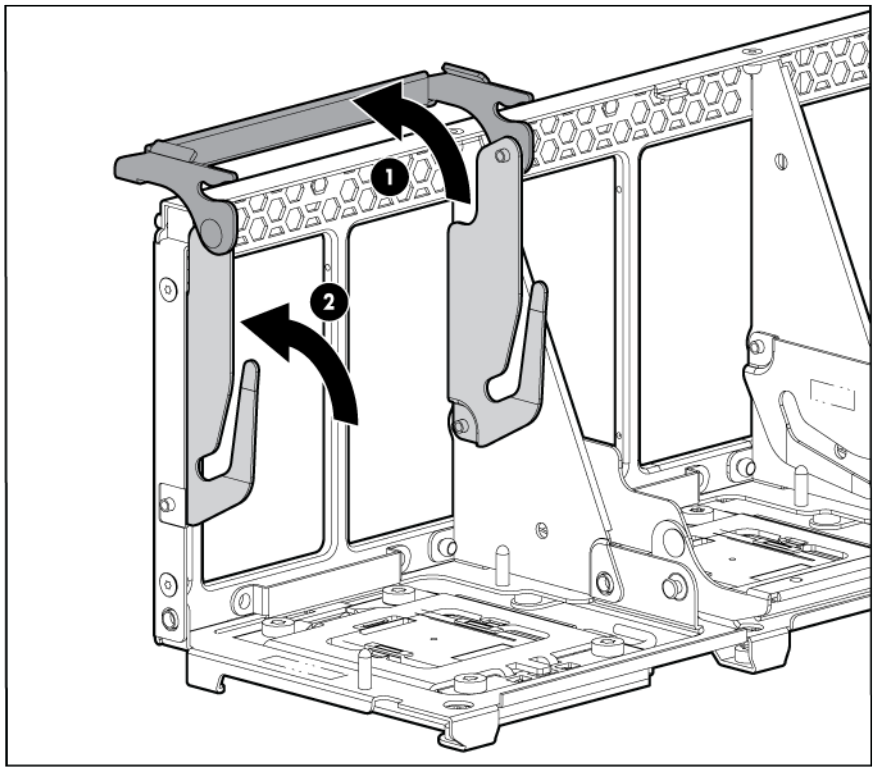
To install the component:

1. Update the system ROM.

   Locate and download the latest ROM version from the HP website (http://www.hp.com/support). Follow the instructions on the website to update the system ROM.
2. Power down the server (on page 22).
3. Remove the processor memory drawer ("Remove the upper or lower processor memory drawer or processor memory drawer blank" on page 24).
4. Remove the processor memory drawer cover.



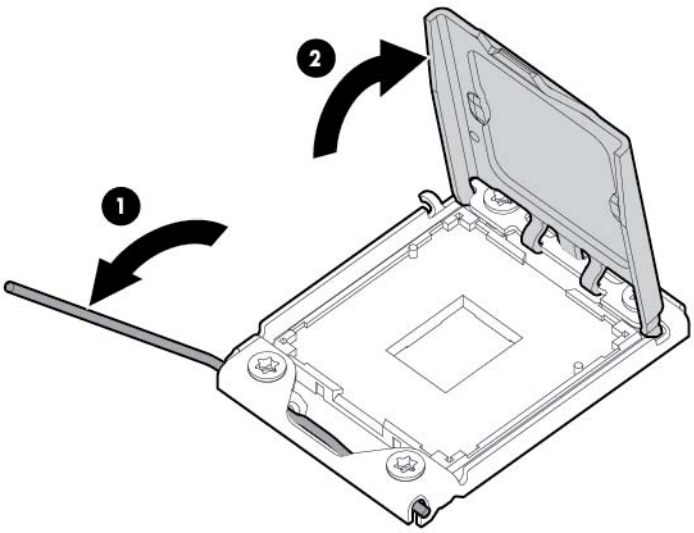
5. Open the heatsink retaining bracket.



6. Open the processor retaining latch and the processor socket retaining bracket.

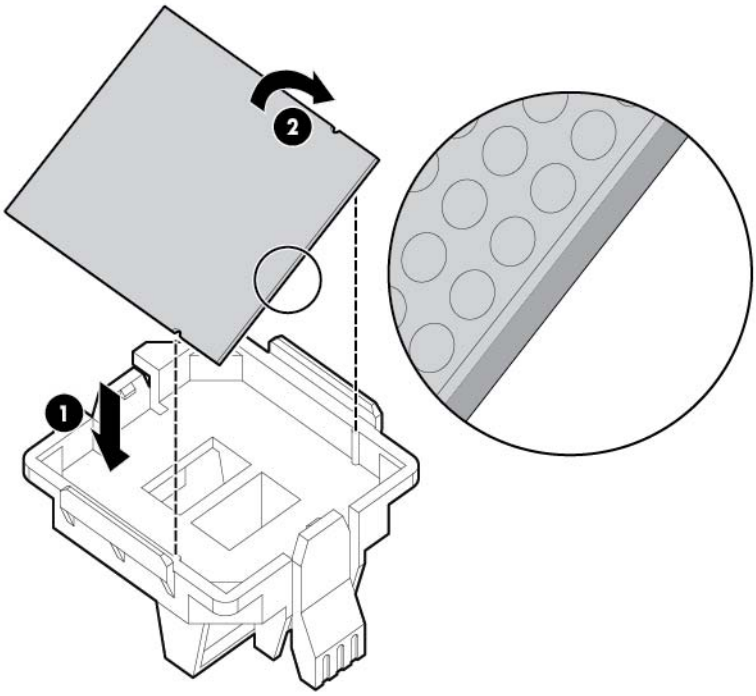
> **CAUTION:** Failure to completely open the processor locking lever prevents the processor from seating during installation, leading to hardware damage.

7. Open the processor locking lever and the processor socket retaining bracket. **Do not remove the processor socket cover**.

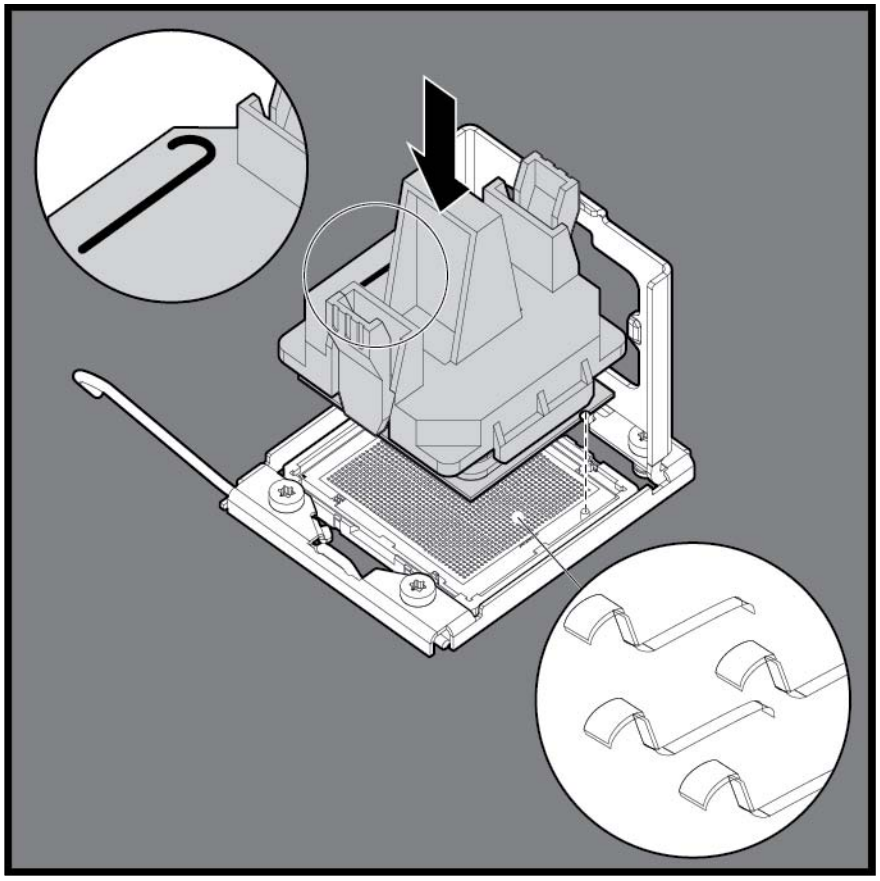


IMPORTANT: Be sure the processor remains inside the processor installation tool.

8. If the processor has separated from the installation tool, carefully re-insert the processor in the tool. Handle the processor by the edges only, and do not touch the bottom of the processor, especially the contact area.



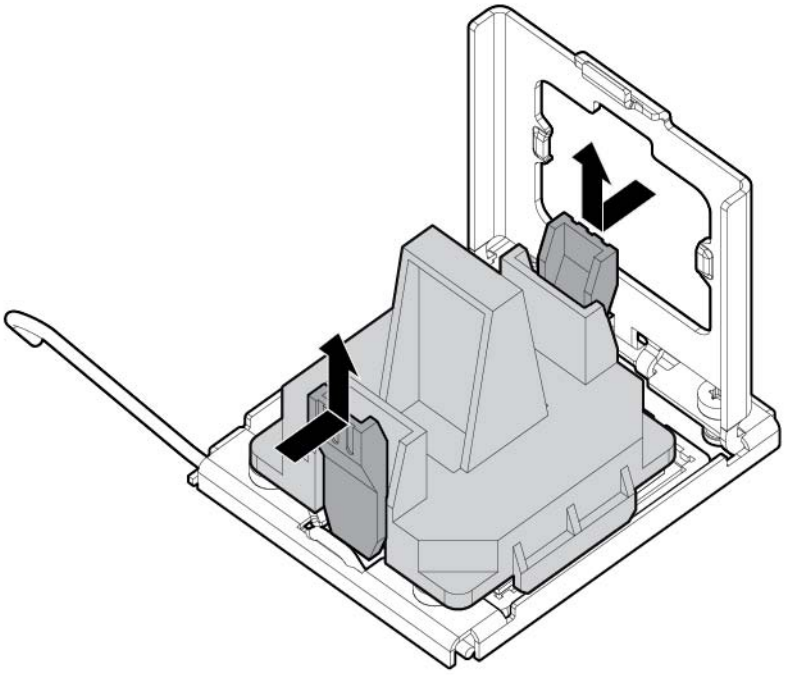
9. Align the processor installation tool with the socket, and then install the processor. **THE PINS ON THE SYSTEM BOARD ARE VERY FRAGILE AND EASILY DAMAGED**.



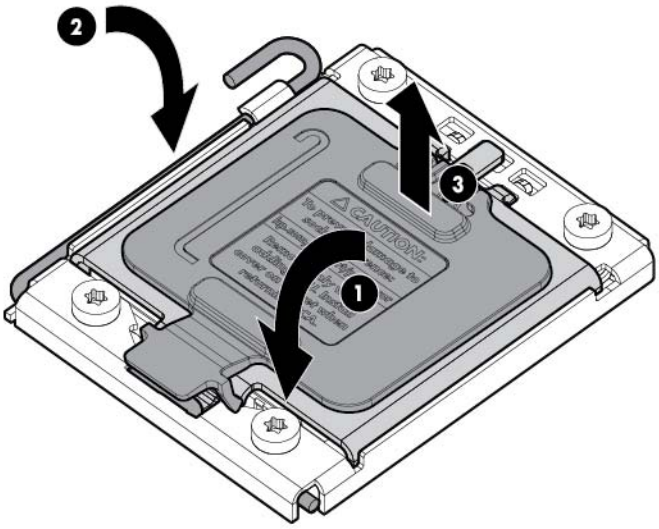
△ **CAUTION: THE PINS ON THE SYSTEM BOARD ARE VERY FRAGILE AND EASILY DAMAGED.** To avoid damage to the system board:

- Never install or remove a processor without using the processor installation tool.
- Do not touch the processor socket contacts.
- Do not tilt or slide the processor when lowering the processor into the socket.

10. Press the tabs on the processor installation tool to separate it from the processor, and then remove the tool.

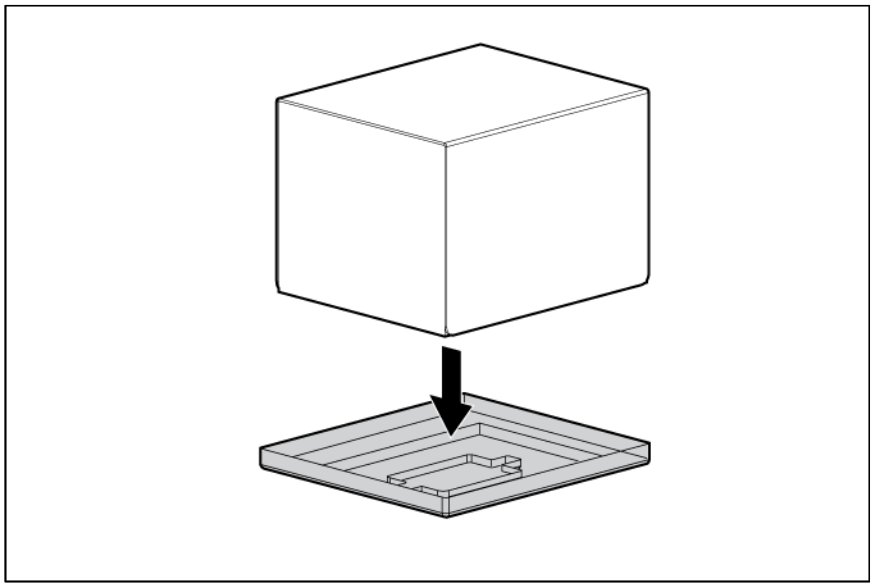


11. Close the processor socket retaining bracket and the processor locking lever. **The processor socket cover is automatically ejected**. Remove the cover.

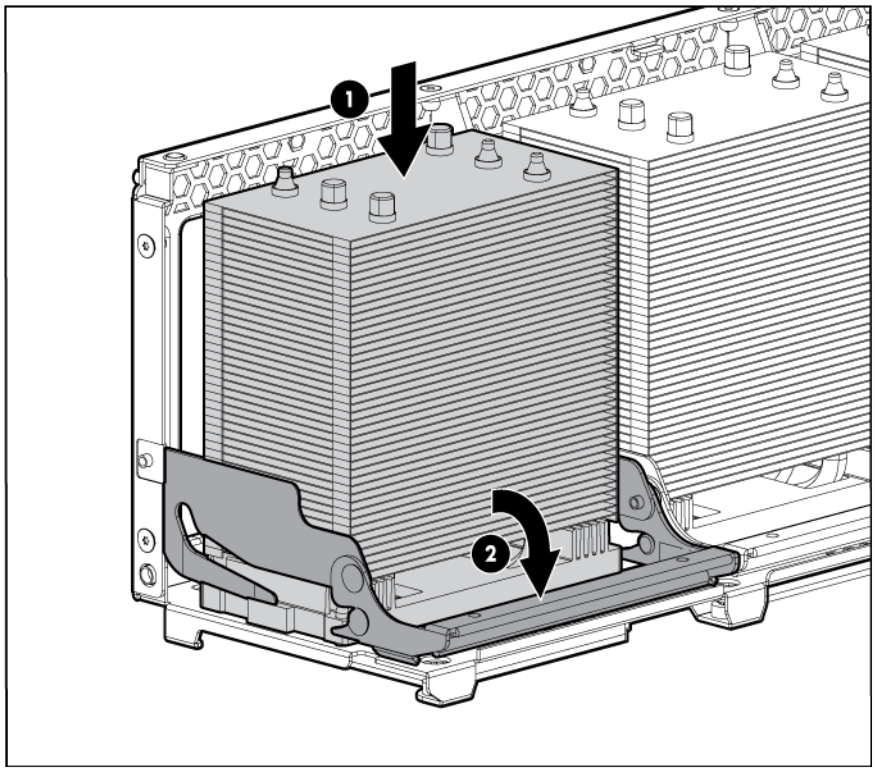


△ **CAUTION:** Be sure to close the processor socket retaining bracket before closing the processor locking lever. The lever should close without resistance. Forcing the lever closed can damage the processor and socket, requiring system board replacement.

12. Remove the heatsink protective cover.



13. Install the heatsink.
14. Close and lock the heatsink retaining bracket.



15. Install the processor memory drawer cover.
16. Install the processor memory drawer.
17. Power up the server (on page 22).

Memory options

This server contains eight memory cartridge connectors in each processor memory drawer. Each memory cartridge can contain eight DIMMs, for a total of 128 DIMMs, for a maximum memory configuration of 2 TB.

The server supports the following DIMM speeds:

- Single- and dual-rank PC3-10600 (DDR-1333) DIMMs operating at 1066 MHz
- Quad-rank PC3-8500 (DDR-1066) DIMMs operating at 1066 MHz

Depending on the processor model, the memory clock speed may be reduced to 1066 or 800 MHz.

IMPORTANT: ProLiant DL980 G7 servers may be unable to provide MMIO (Memory Mapped I/O) memory to all slotted PCI devices during Power-On Self-Test (POST) in large I/O configurations, resulting in the following warning message:
Warning: There is not enough available PCI memory to allocate to all devices installed in the system. Devices which were not allocated requested resources may not operate properly.
This occurs during the I/O configuration phase of POST, after the System ROM has allocated most of the available memory for some PCI devices, leaving insufficient memory for PCI devices that have not yet been configured.
The above message is an indication that the HP ProLiant DL980 G7 server has encountered this MMIO limitation and does not indicate an issue with the server. It can occur when the I/O configuration of the server demands resources beyond those which the platform architecture allows.
This message is an indication that the HP ProLiant DL980 G7 server has encountered this MMIO limitation and does not indicate an issue with the server. It can occur when the I/O configuration of the server demands resources beyond those which the platform architecture allows.
If some PCI devices are not allocated memory and the warning message appears during POST, perform one or more of the following potential workarounds to allow the remaining PCI devices to receive their requested memory allocations:
If the server operating system documentation states that it requires 2GB (or more) of memory below the 4GB address boundary, do not perform Step 1 below because it may result in operating system boot failure.
If the operating system documentation does not specify its memory requirements below the 4GB boundary, the Step 1 procedure below may be attempted. However, if performing Step 1 results in operating system boot failure, perform Step 1 again and change Memory Mapped I/O Options to the default value of 2GB of Memory Mapped I/O , and then perform Step 2 below:

1. Change the MMIO Settings in the ROM-Based Setup Utility (RBSU).
   a. Boot the server.
   b. Press the F9 key during POST (when the F9 prompt appears).
   c. Select Advanced Options.
   d. Select Advanced System ROM Options.
   e. Select Memory Mapped I/O Options.
   f. Change the default selection of 2GB of Memory Mapped I/O to either 3GB of Memory Mapped I/O or Automatically configure Memory Mapped I/O.
   g. Reboot the server and verify that no warning messages appear during POST. If the operating system will not boot, perform Step 1 again and reset Memory Mapped I/O Options to the default value of 2GB of Memory Mapped I/O .
2. If the warning message continues to appear, ensure that all slotted PCI devices are using updated firmware and drivers and reboot the server.
3. If the warning message continues to appear, determine which adapter is least critical for the operating environment and remove or disable that adapter. Repeat this step until the server completes POST without displaying this error message.

NOTE: When an HP ProLiant DL980 G7 server is configured with a DIMM that has an uninitialized SPD area, and the server is running any version of the System ROM detailed in the Scope section below, the Survey Utility in HP SmartStart will report the "Correctable Error Threshold Count" for the DIMM as "Feature Not Supported." However, this is incorrect. The DIMM does actually support "Correctable Error Threshold Count." This issue is only observed when using the Survey Tool in HP SmartStart. In addition, this issue does not affect the operation or functionality of the server or of ECC. It only affects the reporting of ECC capabilities in the DIMM SPD and does not impact any other system operation. Any ProLiant DL980 G7 server configured with a P66 System ROM dated 07/07/2010, 07/27/2010, or 01/27/2011 and using the Survey Tool in SmartStart (any version) may see this issue.
This is only a reporting issue and can be safely ignored. It does not affect the operation or functionality of the server or of ECC. It only affects the reporting of ECC capabilities in the DIMM SPD and does not impact any other system operation. To prevent this issue from occurring, or to correct it after it has already occurred, update the System ROM to a version dated 03/24/2011 (or later).

DIMM support

The server supports the following DIMMs:

- Single- and dual-rank PC3-10600 (DDR3-1333) DIMMs operating at 1066 MT/s

  While single-rank DIMMs are supported, HP recommends dual-rank and quad-rank DIMMs since they provide significant memory throughput and better memory protection (Online Spare memory mode) over single-rank DIMMs.
- Quad-rank PC3-8500 (DDR3-1066) DIMMs operating at 1066 MT/s

Single-, dual-, and quad-rank DIMMs

To understand and configure memory protection modes properly, an understanding of single-, dual-, and quad-rank DIMMs is helpful. Some DIMM configuration requirements are based on these classifications.

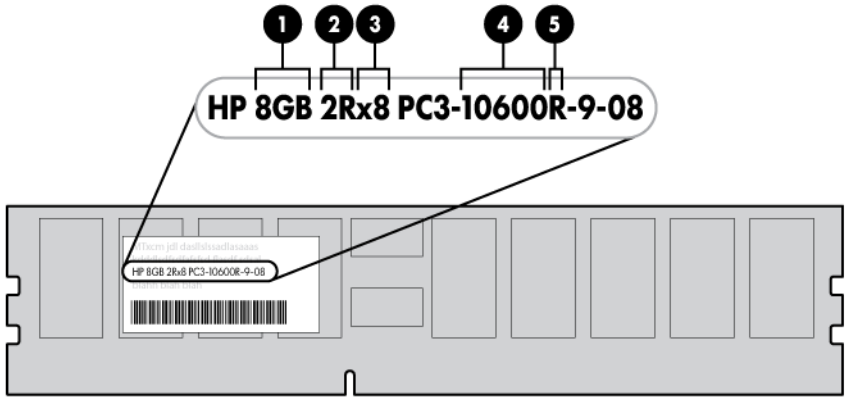
A single-rank DIMM has one set of memory chips that is accessed while writing to or reading from the memory. A dual-rank DIMM is similar to having two single-rank DIMMs on the same module, with only one rank accessible at a time. A quad-rank DIMM is effectively two dual-rank DIMMs on the same module. Only one rank is accessible at a time. The server memory control subsystem selects the proper rank within the DIMM when writing to or reading from the DIMM.

Dual- and quad-rank DIMMs provide the greatest capacity with the existing memory technology. For example, if current DRAM technology supports 2-GB single-rank DIMMs, a dual-rank DIMM would be 4-GB and a quad-rank DIMM would be 8-GB.

Although only one data rank is accessed at any given time for each DIMM, optimized command and address pipelining via various interleaving schemes enables the Intel® Xeon™ 7500-series processor architecture to benefit from dual-rank and quad-rank DIMMs. A dual-rank DIMM performs significantly better than its single-rank counterpart. A quad-rank DIMM provides further performance improvement even at the same DIMM capacity.

DIMM identification

To determine DIMM characteristics, use the label attached to the DIMM and the following illustration and table.



Item	Description	Definition
1	Size	—
2	Rank	1R = Single-rank 2R = Dual-rank 4R = Quad-rank
3	Data width	x4 = 4-bit x8 = 8-bit
4	Memory speed	10600 = 1333-MHz 8500 = 1066-MHz
5	DIMM type	R = RDIMM (registered)

For the latest supported memory information, see the QuickSpecs on the HP website (http://www.hp.com).

DIMM installation guidelines

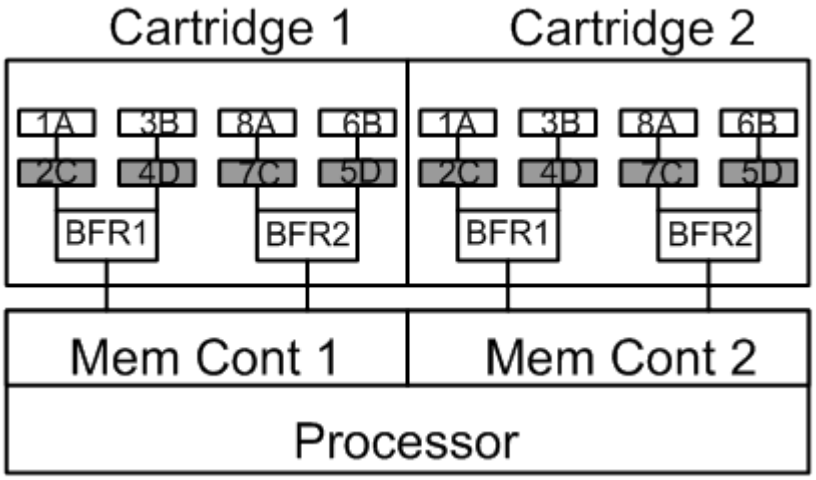
This server supports two memory cartridges per processor. Each memory cartridge can support up to eight DIMMs. Eight memory cartridges provide a total of 128 DIMMs per system. When installing DIMMs in the memory cartridge, observe the following minimum guidelines:

- The minimum configuration is two DIMMs per cartridge. Running in Lockstep mode, such DIMM pairs offer larger memory protection to provide increased memory fault resiliency.
- DIMMs must be installed in quads with identical characteristics. When possible, for configuration simplicity, HP recommends using DIMMs with identical part numbers throughout the system.
- DIMM quads must be populated in sequence by letter designation. Install DIMM quad (1A, 8A in both cartridges) first, followed by DIMM quad (3B, 6B in both cartridges), DIMM quad (2C, 7C in both cartridges) and DIMM quad (4D, 5D in both cartridges).

- To achieve maximum performance, balance DIMM quads by letter groupings across all memory cartridges so that the (1A, 8A) pair is installed in all memory cartridges first, followed by the B-pair, C-pair, and D-pair.
- When installing mixed rank DIMMs in any cartridge, DIMMs with the highest number of ranks must be installed in the white DIMM connector locations. This guarantees proper electrical signaling on the DDR3 channel since DIMMs with higher rank counts present larger electrical loading on the DDR3 channel and must be populated at the end point of the channel. For more information, see the illustration below.

△ **CAUTION:** Failure to follow these guidelines may result in the inability to recognize memory, memory errors, or reduced memory performance.

NOTE: To utilize more than 128GB per processor socket, 44-bit addressing mode must be used (40-bit versus 44-bit addressing is configured in the RBSU). Not all supported operating systems support 44-bit addressing mode; refer to the desired operating system documentation to ensure 44-bit addressing is supported. In 40-bit mode, systems with 4 installed processors are limited to a maximum of 512GB, and systems with 8 installed processors are limited to a maximum of 1TB of addressable memory.



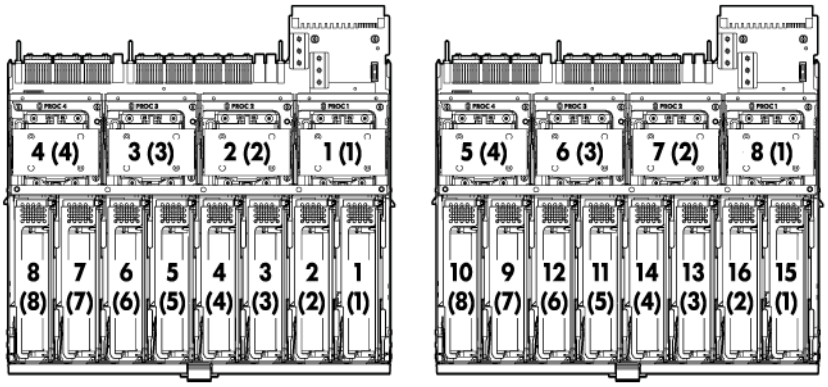
- AMP modes Advanced ECC, Online Spare, and Mirrored Memory have further requirements beyond the ones listed here. For additional memory configuration requirements, see the corresponding AMP sections:
  - Advanced ECC memory population guidelines (on page 46)
  - Online Spare memory population guidelines (on page 47)
  - Mirrored Memory population guidelines (on page 47)

Memory cartridge population guidelines

This server contains eight memory cartridge slots in each processor memory drawer.

Observe the following guidelines:

- Memory must be loaded in quads, with a pair of DIMMs in each memory cartridge for a corresponding processor.



Upper processor memory board is shown on the left. Lower processor memory board is shown on the right.

- Memory is only accessible to the system if the associated processor is installed. Do not install memory cartridges in cartridge slots without the corresponding processor installed.
- Two DIMM populated memory cartridges are required per processor.
- To maximize performance in multi-processor configurations, distribute the total memory capacity evenly across all processors.

IMPORTANT: Be sure you are using the correct spare part number when replacing the memory cartridge. The server ships with one of two different memory cartridges, which are not interchangeable.

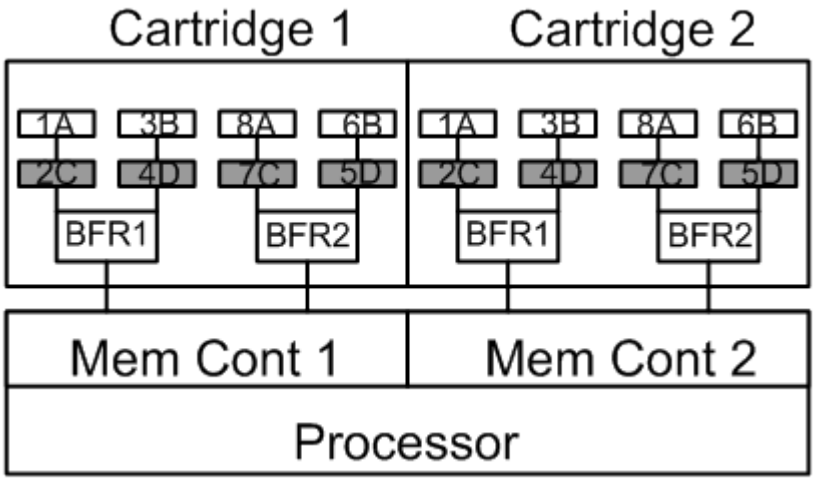
Memory subsystem architecture

The Intel® Xeon™ 7500 processor memory architecture is designed to take advantage of multiple stages of memory interleaving to reduce latency and increase bandwidth.

Each Intel Xeon 7500 processor contains two memory controllers as shown in the illustration below. Each memory controller has two SMI buses operating in Lockstep mode. Each SMI bus connects to a memory buffer. The buffer converts SMI to DDR3 and expands the memory capacity of the system. Each buffer has two DDR3 channels and can support up to four DIMMs for a total of eight DIMMs per cartridge.

- Memory speed is not affected by number of DIMMs or ranks. All DIMMs run at the highest possible speed for a given processor.
- DDR3 memory speed is a function of the QPI bus speed supported by the processor:
  - Processors with a QPI speed of 6.4 GT/s run memory at 1066 MT/s.
  - Processors with a QPI speed of 5.6 GT/s run memory at 978 MT/s.
  - Processors with a QPI speed of 4.8 GT/s run memory at 800 MT/s.

- Successive cache lines are interleaved between the DIMMs and the Lockstep SMI channels of the two memory controllers in the processor such that adjacent cache lines reside on different memory controllers, SMIs, DIMMs, and DIMM ranks for better performance. To take advantage of this feature, DIMMs should be populated evenly between all SMI channels. If an SMI channel pair has more DIMMs than others, the extra memory on that SMI channel pair does not benefit from the interleaving mechanism across memory controllers.



Hemisphere mode

The Intel® Xeon™ 7500-series processor architecture incorporates Hemisphere mode, a high-performance interleaving technology. Hemisphere mode combines the tracking resources of both memory controllers within each processor for a more aggressive cache line pipelining.

Hemisphere mode is the only supported configuration, and is enabled in RBSU when processors in the system have identical DIMM population behind both of their memory controllers. That is to say, all populated memory cartridges are populated the same way.

- Hemisphere mode should produce the best overall performance for a variety of applications.
- To enable each processor to enter Hemisphere mode, both memory cartridges must be installed and populated with equal memory capacities based on the DIMM installation guidelines (on page 41).
- Greater performance is obtained when all cartridges are populated with either four or eight dual- or quad-rank DIMMs.
- The server supports Mirrored Memory mode while Hemisphere mode is enabled.

Memory performance optimization

The server supports 128 DIMMS across eight Multi-core processors (64 DIMMs across four multi-core processors, in each processor memory drawer). While there are many DIMM population configurations that can support any total memory size, optimal performance is achieved when populated DIMMs can take advantage of the Intel® Xeon™ 7500-series processor architecture.

To achieve the best performance for a given memory processor configuration, observe the following guidelines:

- The largest contributor to maximum memory bandwidth performance is to use both memory controllers inside the processor. To achieve maximum memory bandwidth performance, populate both memory cartridges for each installed processor. This configuration is required for this server.
- The second largest contributor to performance is to populate each DDR3 channel in each memory cartridge. To achieve this, the minimum DIMM count per cartridge is four DIMMs installed in DIMM pair locations A and B.
- The next largest contributor to performance is the number of ranks per DIMM. Dual-rank DIMMs perform significantly better than single-rank DIMMs. Quad-rank DIMMs offer a further performance boost.
- The best performance is obtained when all installed processors are enabled for Hemisphere mode. Hemisphere mode is optimum when four or eight DIMMs are installed per cartridge. Hemisphere mode can be achieved with two or six DIMMs per cartridge (2 cartridges per processor), but this configuration is not optimal for Hemisphere mode. Hemisphere mode is required for this server.
- Maximum throughput is achieved when all memory cartridges are fully populated with the maximum number of eight quad-rank DIMMs per cartridge.

Plan the memory configurations using identical DIMMs to achieve the memory size target, taking into account that 64- and 128-DIMM count configurations result in the highest performance. Using a four-processor configuration as an example, do the following:

- If the initial memory target is 64 GB, populate a four-processor system with eight cartridges of four 2-GB DIMMs each for a total of 32 DIMMs.
- For 4-GB DIMMs, the initial memory target is 128-GB using 32 DIMMs. The maximum expansion target is 256 GB with 64 DIMMs.
- For 8-GB DIMMs, the initial memory target is 256-GB using 32 DIMMs. The maximum expansion target is 512 GB with 64 DIMMs.
- The maximum system memory capability is achieved with an initial memory target of 512 GB with 32 x 16-GB DIMMs and 1 TB with 64 x 16-GB DIMMs.

For an eight-processor configuration, the same example applies, but must be done for both processor memory drawers, resulting a doubling of the memory capacity, and a 2 TB maximum with 128 x 16 GB DIMMs.

Memory RAS

The server supports the following AMP modes:

- Advanced ECC memory mode provides the greatest memory capacity for a given DIMM size and provides x4 and x8 SDDC. This mode is the default option for this server. For more information, see "Advanced ECC memory population guidelines (on page 46)."
- Online Spare memory mode provides protection against persistent DRAM failure. Rank-sparing is more efficient than DIMM-sparing since only a portion of a DIMM is set aside for memory protection. For more information, see "Online Spare memory population guidelines (on page 47)."
- Mirrored Memory mode provides the maximum protection against failed DIMMs. Uncorrectable errors in the DIMMs of one memory cartridge are corrected by the DIMMs in the mirrored cartridge. The two memory controllers of each processor form a mirrored pair using two memory cartridges. For more information, see "Mirrored Memory population guidelines (on page 47)."

AMP modes are configured in RBSU. If the requested AMP mode is not supported by the installed DIMM configuration, the server boots in Advanced ECC mode. For more information, see "HP ROM-Based Setup Utility (on page 77)."

For the latest memory configuration information, see the QuickSpecs on the HP website (http://www.hp.com/go/ProLiant).

Advanced ECC memory population guidelines

Advanced ECC memory is the default memory protection mode for the server. Up to 2-TB of active memory using 16-GB DIMMs is supported in this AMP mode.

Advanced ECC can correct single-bit and multi-bit memory errors on a single x8 or two adjacent x4 DRAM devices.

The server provides notification when correctable error events have exceeded a pre-defined threshold rate. When uncorrectable errors are detected using Advanced ECC, the server notifies the user and shuts down the operating system.

IMPORTANT: When attempting to install or boot VMware ESX 4.1 on a ProLiant DL980 G7 server with Advanced Memory Protection (Memory Mirroring) enabled, the following error message will be displayed:
The system has found a problem on your machine and cannot continue.
The BIOS will report that NUMA node 1 has no memory. When implementing memory mirroring on the ProLiant DL980 G7 server, the sockets are paired so that the even socket of each pair is considered primary and the odd socket is the mirror. However, the system reports that the cores on the odd sockets do not have any local memory.
If Memory Mirroring is enabled prior to VMware installation, then immediately after BIOS POST and when the VMware installation begins, press F2 and add the following line to the boot options:
useNUMAInfo=false
After installation, the system will reboot. Perform the following:

1. At the boot menu, press "a" to modify the kernel argument and add "useNUMAInfo=false" to the end of the "grub append>" line.
2. Boot to VMware ESX 4.1.
3. Log into the newly installed VMWare Server with vSphere Client or vCenter Client.
4. Navigate to: Configuration Panel -> Software Advanced Settings -> VMKernel
5. Uncheck "VMkernel.Boot.useNUMAInfo" to disable NUMA.

If Memory Mirroring will be enabled after VMware is installed, perform the following:

6. Log into the installed VMWare Server using the vSphere Client or vCenter Client application.
7. Navigate to Configuration Panel -> Software Advanced Settings -> VMKernel l
8. Uncheck "VMkernel.Boot.useNUMAInfo" to disable NUMA prior to enabling memory mirroring.

Online Spare memory population guidelines

Online spare memory provides protection against persistent DRAM failure. It monitors DIMMs for excessive correctable errors and copies the content of an unhealthy rank to an available spare rank in advance of multi-bit or persistent single-bit failures that may result in uncorrectable faults. Rank-sparing is more efficient than DIMM-sparing since only a portion of a DIMM is set aside for memory protection.

When Online Spare memory is enabled, the first ranks of DIMM pair, 1A/8A, are set aside as the sparing ranks. Therefore, the available memory is reduced by the size of the first ranks of DIMM pair 1A/8A.

If a DIMM rank on either of the SMI buses exceeds its correctable ECC threshold, then the contents of the failing DIMM ranks are copied to the spare DIMM ranks. Once the copy is complete, all memory accesses to the previous failing DIMM ranks go to the spare DIMM ranks.

No performance penalty occurs for rank-sparing, other than the time it takes to copy the data from the failing rank to the spare rank upon an error condition.

The following population rules apply to each memory cartridge. Begin with the DIMM installation guidelines (on page 41) with these additional constraints:

- All installed processors must contain a valid sparing configuration.
- If installing mixed rank DIMMs in a cartridge, follow the mixed rank installation rules of the DIMM installation guidelines (on page 41).
- Rank sparing requires that the spare ranks of the DIMM pair 1A/8A be at least as large as any other DIMM rank on the DDR3 channels of the cartridge. To determine the size of a single rank in a DIMM, divide the total DIMM size by the number of ranks.

  For example, the rank size of a dual-rank 2-GB DIMM is 1 GB and the rank size of a dual-rank 4-GB DIMM is 2 GB. Therefore, it is possible to support rank sparing with mixed DIMM pair sizes in the cartridge if the 1A/8A pair is populated with the 4-GB DIMMs and the other pairs are populated with either the identical 4-GB or 2-GB DIMMs (pairs C and D are not required to be populated). In this case, the 2-GB rank size of the 4-GB DIMMs in the 1A/8A pair is equal to or greater than the rank size of the other installed DIMMs.

  However, the server cannot support DIMM sparing in this example if the 2-GB DIMMs are populated in the 1A/8A pair locations and the 4-GB DIMMs are populated in any of the remaining DIMM pair locations. This is because it violates the rule requiring that the spare rank size of DIMM pair 1A/8A (1 GB) be equal to or larger than the single rank size of the other DIMM pair locations, since the rank size of a 4-GB DIMM in pairs B, C, or D would be larger (2 GB) than the spare rank size of the 2-GB DIMM pair in 1A/8A (1 GB).

Mirrored Memory population guidelines

Errors that are not corrected by ECC or SDDC cannot be corrected by Online Spare memory. By providing added redundancy in the memory sub-system, Mirrored Memory provides the greatest protection against memory failure beyond ECC, SDDC, and Online Spare memory.

In Mirrored Memory mode, each Lockstep DIMM pair of a memory controller (of a memory cartridge connected to a processor) has a mirrored DIMM pair on the other memory cartridge of the sibling processor in the same QPI island.

Upon detecting an uncorrectable memory error from a DIMM pair of a memory cartridge, the processor avoids a system crash by reading the mirrored DIMM pairs from the other memory cartridge. In this case, the

system management routine disables the failed DIMM. Further memory reads and writes will only occur on the mirrored DIMM pairs.

The exceptions to Mirrored Memory mode are the following:

- In Mirrored Memory mode, half of the memory is allocated to memory protection.
- The available memory bandwidth is reduced by up to 50% in this mode.
- Mirrored Memory mode, Online Spare mode, Hemisphere mode, and interleaving cannot be enabled simultaneously.

To configure memory for Mirrored Memory mode, observe these additional constraints:

- For the server to support Mirrored Memory, all processors must have a valid mirroring configuration.
- The minimum allowable configuration is two memory cartridges per processor.
- Both memory cartridges for each processor must be populated with the same DIMM configurations.
- Both of the CPU sockets on the same QPI island must be loaded with identical memory.

IMPORTANT: When attempting to install or boot VMware ESX 4.1 on a ProLiant DL980 G7 server with Advanced Memory Protection (Memory Mirroring) enabled, the following error message will be displayed:
The system has found a problem on your machine and cannot continue.
The BIOS will report that NUMA node 1 has no memory. When implementing memory mirroring on the ProLiant DL980 G7 server, the sockets are paired so that the even socket of each pair is considered primary and the odd socket is the mirror. However, the system reports that the cores on the odd sockets do not have any local memory.
If Memory Mirroring is enabled prior to VMware installation, then immediately after BIOS POST and when the VMware installation begins, press F2 and add the following line to the boot options:
useNUMAInfo=false
After installation, the system will reboot. Perform the following:

1. At the boot menu, press "a" to modify the kernel argument and add "useNUMAInfo=false" to the end of the "grub append>" line.
2. Boot to VMware ESX 4.1.
3. Log into the newly installed VMWare Server with vSphere Client or vCenter Client.
4. Navigate to: Configuration Panel -> Software Advanced Settings -> VMKernel
5. Uncheck "VMkernel.Boot.useNUMAInfo" to disable NUMA.

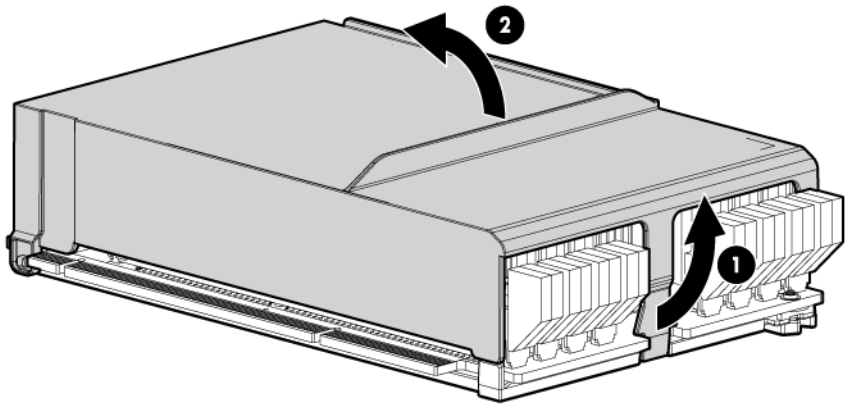
If Memory Mirroring will be enabled after VMware is installed, perform the following:

6. Log into the installed VMWare Server using the vSphere Client or vCenter Client application.
7. Navigate to Configuration Panel -> Software Advanced Settings -> VMKernel l
8. Uncheck "VMkernel.Boot.useNUMAInfo" to disable NUMA prior to enabling memory mirroring.

IMPORTANT: If all installed memory is configured for a single CPU on a ProLiant DL980 G7 server running Red Hat Enterprise Linux 5, an error message similar to the following may appear when the server is operating under a heavy workload, prior to the server becoming unresponsive: soft lockup - CPU#21 stuck for 10s!
This occurs because configuring all server memory for a single CPU results in contention of all other CPUs for communication to the single node configured with memory. This contention is exacerbated when running processes with high memory resource requirements.
This issue is not specific to the HP ProLiant DL980 G7 server. Any server using the Non-Uniform Memory Access (NUMA) multiprocessing architecture when all memory is configured for a single CPU may be affected. Although this has been observed under Red Hat Enterprise Linux 5, it may also occur under Red Hat Enterprise Linux 4 and SUSE Linux Enterprise Server 10.
Recent Linux kernels (for example, kernels in Red Hat Enterprise Linux 6.x and SUSE Linux Enterprise Server 11) have improved methods for dealing with memory and should not experience this issue. To avoid this issue when running Red Hat Enterprise Linux 4, Red Hat Enterprise Linux 5, or SUSE Linux Enterprise Server 10, utilize the DIMM installation guidelines (on page 41) for the ProLiant DL980 G7
server:

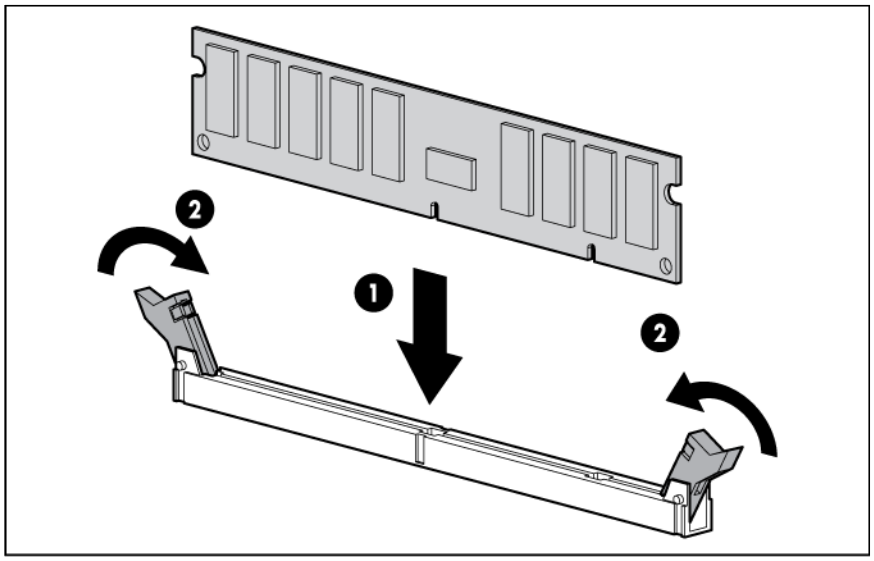
Installing memory

1. Power down the server (on page 22).
2. Remove the processor memory drawer ("Remove the upper or lower processor memory drawer or processor memory drawer blank" on page 24).
3. Remove the memory cartridge.
4. Open the memory cartridge cover.

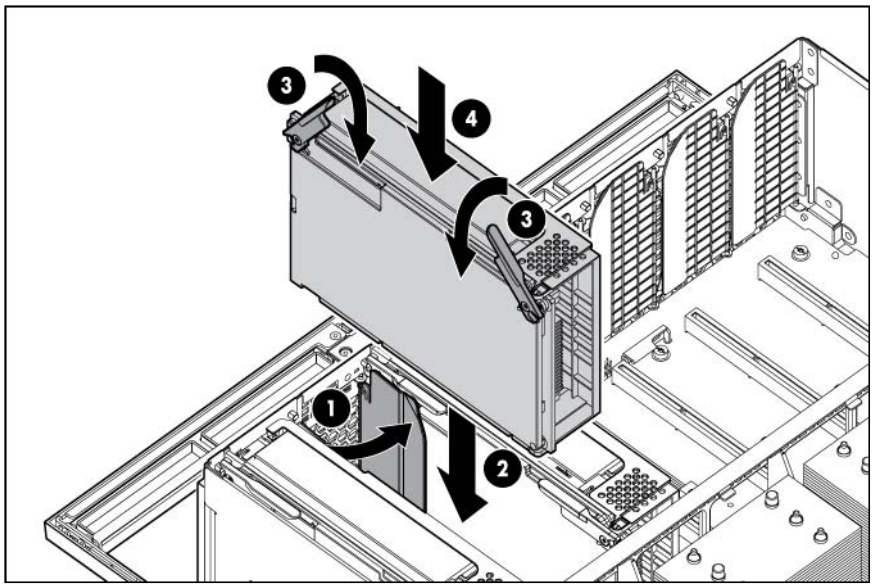


5. Open the DIMM slot latches.

6. Install the DIMM. See "Memory options (on page 38)."



7. Close the memory cartridge cover.
8. Install the memory cartridge.



9. Install the processor memory drawer cover.
10. Install the processor memory drawer.
11. Power up the server.

Hot-plug hard drive option

When adding hard drives to the server, observe the following general guidelines:

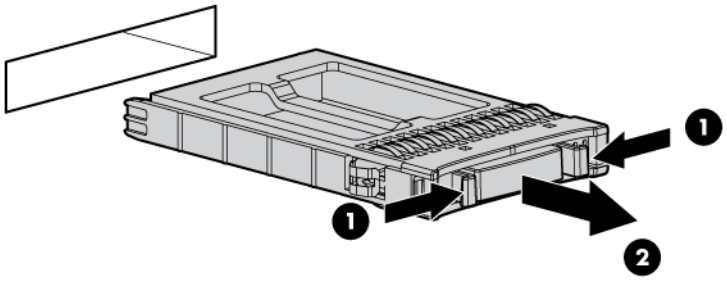
- The system automatically sets all device numbers.
- If only one hard drive is used, install it in the bay with the lowest device number.
- Hard drives must be SFF types.

Drives should be the same capacity to provide the greatest storage space efficiency when drives are grouped together into the same drive array.

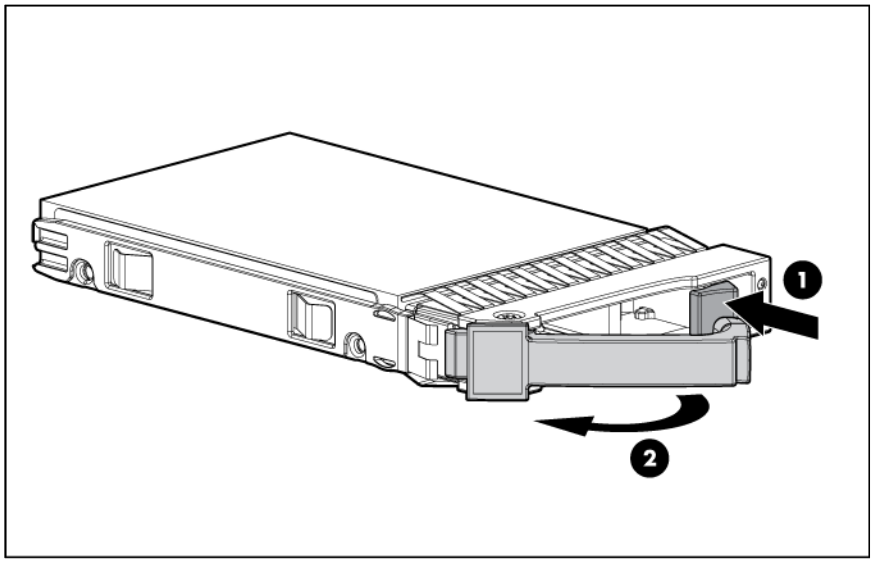
For hard drive numbers, see "Device numbers (on page 18)."

To install the component:

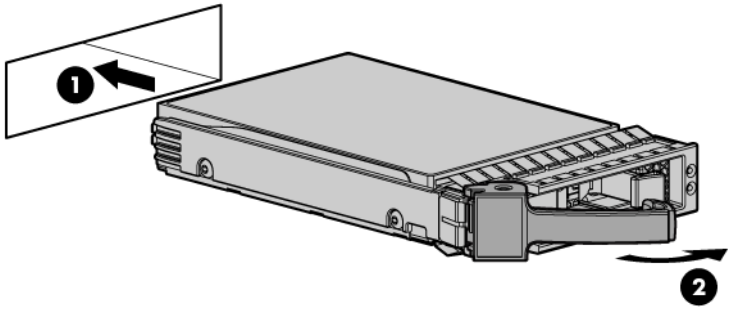
1. Remove the hard drive blank.



2. Prepare the SAS hard drive.



3. Install the hard drive.



4. Determine the status of the hard drive from the hot-plug SAS hard drive LED combinations ("SAS hard drive LED combinations" on page 19).

Redundant hot-plug power supply option

The server supports up to four hot-plug power supplies. Install all power supplies to provide full redundancy.

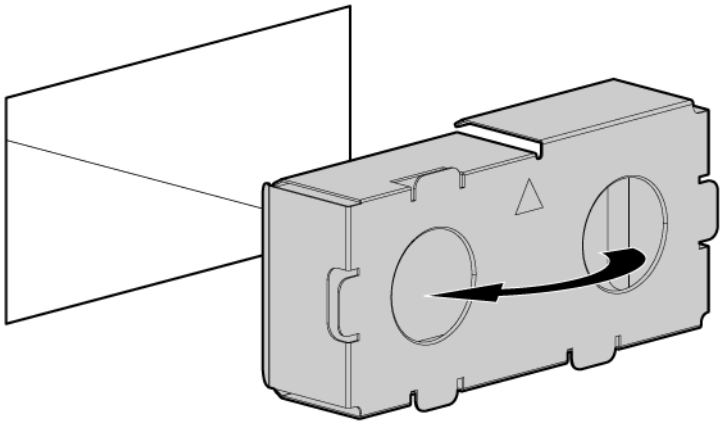
HP recommends installing redundant hot-plug power supplies in pairs.

To confirm the redundancy of your configuration, see the HP power advisor at the HP website (http://www.hp.com/go/hppoweradvisor).

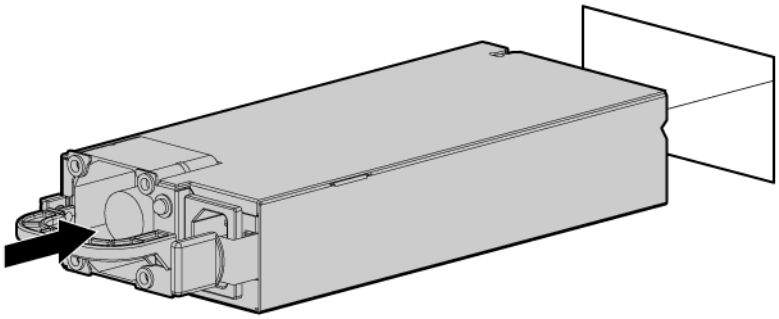
⚠ **WARNING:** To reduce the risk of electric shock or damage to the equipment:

- Do not disable the power cord grounding plug. The grounding plug is an important safety feature.
- Plug the power cord into a grounded (earthed) electrical outlet that is easily accessible at all times.
- Unplug the power cord from the power supply to disconnect power to the equipment.
- Do not route the power cord where it can be walked on or pinched by items placed against it. Pay particular attention to the plug, electrical outlet, and the point where the cord extends from the server.

1. Remove the power supply blank.



2. Slide the power supply into the power supply bay until the device locks into place.

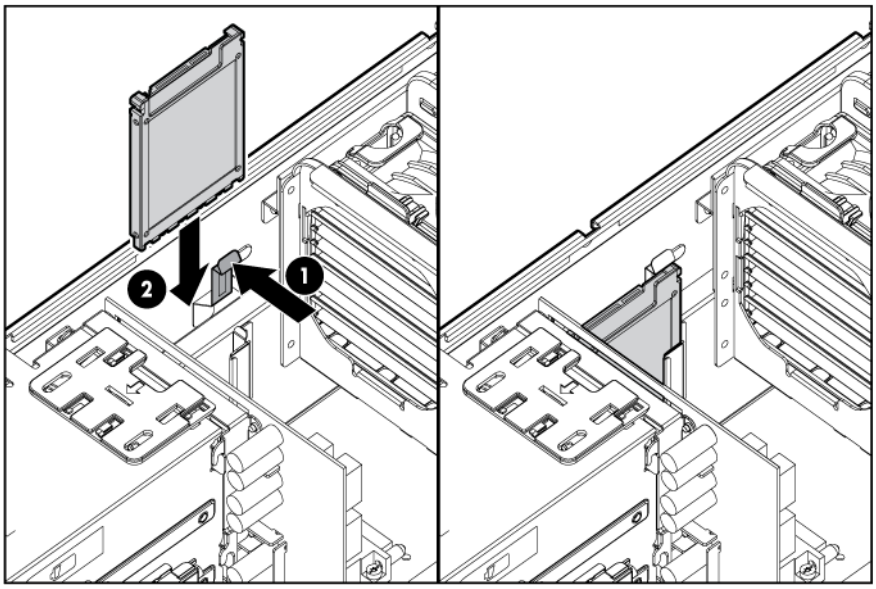


3. Connect the power cord to the power supply.

4. Connect the power cord to the power source.
5. Be sure that the power supply LED is green ("Power supply LED" on page 13).
6. Be sure that the front panel external health LED is green ("Front panel LEDs" on page 8).

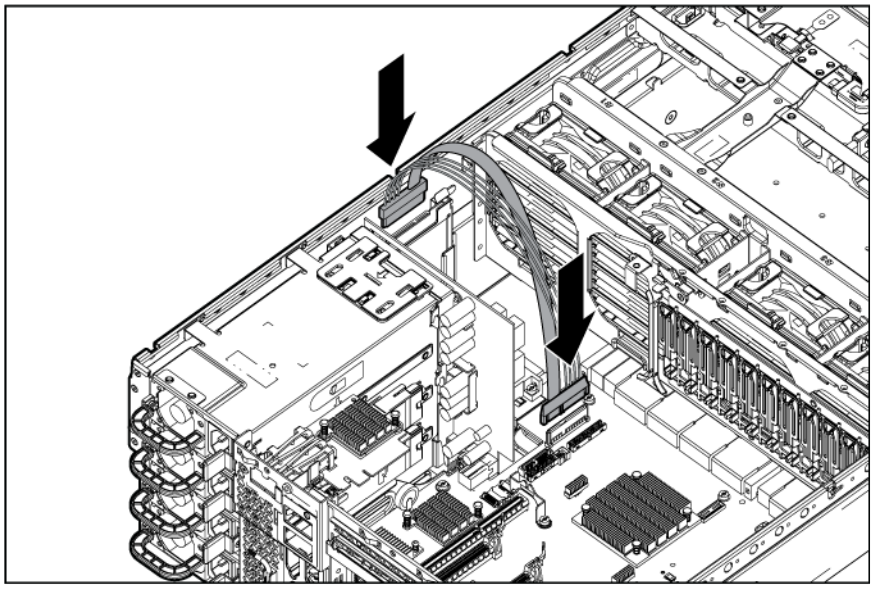
Internal solid state drive expansion bay option

1. Power down the server (on page 22).
2. Extend the server from the rack (on page 22).
3. Remove the access panel (on page 23).
4. Remove the SPI board.
5. Install the solid state drive.



6. Connect the cable.

   The cable and the cable arrangement might appear differently from shown.



7. Install the SPI board.
8. Install the access panel.
9. Slide the server back into the rack.
10. Power up the server (on page 22).

Expansion board options

In the main I/O tray the server supports up to 11 expansion slots. The server ships with 5 PCI Express expansion slots.

To support the optional expansion slots, install one of the following options into the server:

- PCI Express I/O Expansion Board—Adds six optional slots
- PCI-X/PCI Express I/O Expansion Board—Adds five optional slots

IMPORTANT: For ProLiant DL980 G7 servers, when there is an HP NC550SFP 10Gb 2-port PCIe x8 Ethernet Adapter in I/O slot 9 and an HP CN1000E Converged Network Adapter in I/O slot 10, during a network stress test (netperf), the connection in the second port of the CN1000E may be dropped. This issue may also occur when there is an HP CN1000E Converged Network Adapter in slot 9 and a HP CN1000E Converged Network Adapter in slot 10.
This issue occurs in the following scenario:

1. Run a network stress test (netperf).
2. Shut down the stress test and reboot the server.
3. Run netperf again.
4. The connections to the clients will be made at a slow rate and then finally the connection to slot 9 and 10 will be dropped.

This occurs because the ServerEngines driver is not getting enough MSI messages at driver load time. On a ProLiant DL980 system, the driver is not getting enough MSI-X interrupts, so the system is reverting to legacy interrupt mode.

For any ProLiant DL980 G7 server running Windows Server 2008 that has either an NC550SFP in slot 9 and an HP CN1000E Converged Network Adapter in slot 10 or an HP CN1000E Converged Network Adapter in slot 9 and an HP CN1000E Converged Network Adapter in slot 10, perform the following to allow netperf to run in this configuration without connections dropping:

1. Go to the Start menu, then "Run."
2. Type "cmd."
3. From the command prompt, type "bcdedit /set UsePhysicalDestination yes."

IMPORTANT: When multiple LAN-On-Motherboard (LOM) ports on an NC375i Network Adapter configured in a ProLiant DL980 G7 server are connected to a DHCP and a PXE server, booting from the PXE server may not succeed with the following error message:
No filename or root path specified
(There is no F12 key option available to boot from a PXE server.)
This occurs due to the PXE implementation in the adapter firmware, which is not HP-specific.
his issue only occurs when more than one LOM ports are connected AND Port 2 is used to boot from the PXE server. If only Port 2 is connected, the PXE boot will succeed.

IMPORTANT: If an HP ProLiant DL980 G7 with System ROM 2010.07.27 or a ProLiant DL580 G7 with System ROM 2010.08.28 is used with Integrated Lights-Out 3 (iLO 3) Firmware Version 1.15 (or later) and I/O cards are installed in SubIO (I/O expansion board) slots or LPIO (Low Profile PCI-e I/O expansion board) slots, then the server Power-On-Boot process may stop responding at the point where "Inlet Ambient Temperature" is displayed.
The issue has been detected with a large range of I/O cards including the HP NC522SFP 10G NIC, Smart Array P212 Controller, and Smart Array P800 Controller. In addition, this may also potentially occur when any I/O card is installed in SubIO/LPIO slots with the BIOS/iLO 3 firmware combination described above.When this occurs, there are no Integrated Management Log (IML) events or other indications other than the boot sequence does not progress past "Inlet Ambient Temperature" as shown above.
To prevent the server from ceasing to respond during the Power-On-Boot process, upgrade the System ROM to HP ProLiant DL980 G7 System ROM 2011.01.27 (or later).

IMPORTANT: Any HP ProLiant DL980 server configured with any of the following HP IO Accelerator cards:

- 160GB SLC PCIe ioDrive (part number 600278-B21)
- 320GB MLC PCIe ioDrive (part number 600279-B21)
- 320GB SLC PCIe ioDuo (part number 600281-B21)
- 640GB MLC PCIe ioDuo (part number 600282-B21)
- 1.28TB MCL PCIe ioDuo (part number 641027-B21)

may experience thermal throttling when the server is running a System ROM dated July 27, 2010 (2010.07.27) or July 7, 2010 under both of the following conditions:

- An application has sustained high WRITE-bandwidth demands to the HP IO Accelerators.
- High ambient (data center) temperature (>25deg C).

When the IO accelerator card begins thermal throttling, the system will display the following warnings:

Thermal throttling activated (<junction temp in degC>)

When the IO accelerator card stops thermal throttling, the system will display the following warning:

Thermal throttling deactivated (<junction temp in degC>)

The above warning messages will be logged as follows:

- For Linux operating systems in: /var/log/messages
- For Windows operating systems in: the Windows system event log.

To avoid the temperature messages, perform either of the following:

- Accept "reduced write bandwidth" when prompted by the server. (With reduced cooling, the IO Accelerator cards will self manage the critical internal component temperature to stay within specifications. With no firmware change, the IO Accelerator cards will reduce WRITE bandwidth to remain within temperature specifications. The expected WRITE bandwidth reduction is relatively small.)
- Upgrade the System ROM to a version dated January 27, 2011 (1/27/2011) or later.

IMPORTANT: When the HP ProLiant DL980 G7 server is configured with the Low-profile PCI Express I/O expansion kit (Option Part Number AM434A) and no additional I/O backplane options are installed, I/O devices installed in the Low Profile I/O backplane may not function, causing the operating system to generate a machine check when attempting to access the devices.

When this occurs, a message similar to the following will be displayed in the Integrate Management Log (IML):

Uncorrectable Machine Check Exception (Board 0, Processor 5 or 6, APIC ID 0x000000A0, Bank 0x0000000B or 0x0000000C, Status 0xFA000000'00160F0F, Address 0x00000000'00000000, Misc 0x65000000'00000090)

This is targeted to be resolved in a future version of the System ROM. As a workaround, perform either of the following:

- Remove the Low-profile PCI Express I/O expansion kit (Option Part Number AM434A)
- Order either of the following I/O backplane options and then add them to the server:
  - PCI Express I/O expansion kit option part number 588139-B21
  - PCI-X / PCI Express I/O expansion kit option part number 588137-B21

IMPORTANT: ProLiant DL980 G7 servers may be unable to provide MMIO (Memory Mapped I/O) memory to all slotted PCI devices during Power-On Self-Test (POST) in large I/O configurations, resulting in the following warning message:
Warning: There is not enough available PCI memory to allocate to all devices installed in the system. Devices which were not allocated requested resources may not operate properly.
This occurs during the I/O configuration phase of POST, after the System ROM has allocated most of the available memory for some PCI devices, leaving insufficient memory for PCI devices that have not yet been configured.
The above message is an indication that the HP ProLiant DL980 G7 server has encountered this MMIO limitation and does not indicate an issue with the server. It can occur when the I/O configuration of the server demands resources beyond those which the platform architecture allows.
This message is an indication that the HP ProLiant DL980 G7 server has encountered this MMIO limitation and does not indicate an issue with the server. It can occur when the I/O configuration of the server demands resources beyond those which the platform architecture allows.
If some PCI devices are not allocated memory and the warning message appears during POST, perform one or more of the following potential workarounds to allow the remaining PCI devices to receive their requested memory allocations:
If the server operating system documentation states that it requires 2GB (or more) of memory below the 4GB address boundary, do not perform Step 1 below because it may result in operating system boot failure.
If the operating system documentation does not specify its memory requirements below the 4GB boundary, the Step 1 procedure below may be attempted. However, if performing Step 1 results in operating system boot failure, perform Step 1 again and change Memory Mapped I/O Options to the default value of 2GB of Memory Mapped I/O , and then perform Step 2 below:

1. Change the MMIO Settings in the ROM-Based Setup Utility (RBSU).
   a. Boot the server.
   b. Press the F9 key during POST (when the F9 prompt appears).
   c. Select Advanced Options.
   d. Select Advanced System ROM Options.
   e. Select Memory Mapped I/O Options.
   f. Change the default selection of 2GB of Memory Mapped I/O to either 3GB of Memory Mapped I/O or Automatically configure Memory Mapped I/O.
   g. Reboot the server and verify that no warning messages appear during POST. If the operating system will not boot, perform Step 1 again and reset Memory Mapped I/O Options to the default value of 2GB of Memory Mapped I/O .
2. If the warning message continues to appear, ensure that all slotted PCI devices are using updated firmware and drivers and reboot the server.
3. If the warning message continues to appear, determine which adapter is least critical for the operating environment and remove or disable that adapter. Repeat this step until the server completes POST without displaying this error message.

NOTE: Five or more PCIe IO Accelerator Cards are now supported when running DL980 G7 System ROM version 2011.01.27 (or later) and PCIe IO Accelerator Card firmware driver version 2.2.3 (or later).

The server supports up to 5 low profile PCI Express expansion slots in the optional low profile PCI Express expansion module.

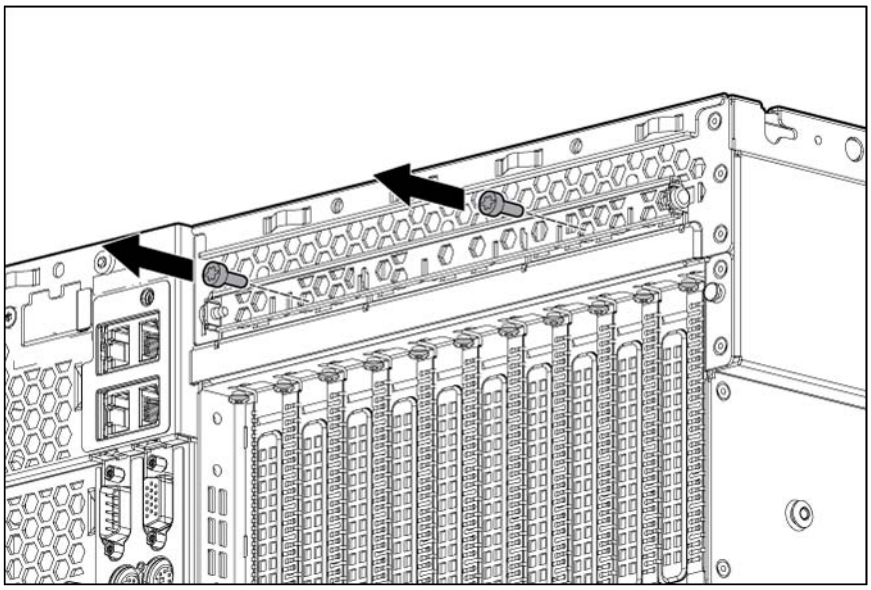
IMPORTANT: On an HP ProLiant DL980 G7 server with a 128 logical CPU configuration, if an HP NC382T PCI Express Dual Port Multifunction Gigabit Server Adapter is located in any Low Profile IO slot, the network connection may drop or the NIC may stop responding. This can occur while running Windows Server 2008 R2 and HP Network Configuration Utility for Windows Server 2008 R2 Version 10.10 or Version 10.20. To prevent network connections from dropping, upgrade to HP Network Configuration Utility for Windows Server 2008 R2 Version 10.30 (or later).

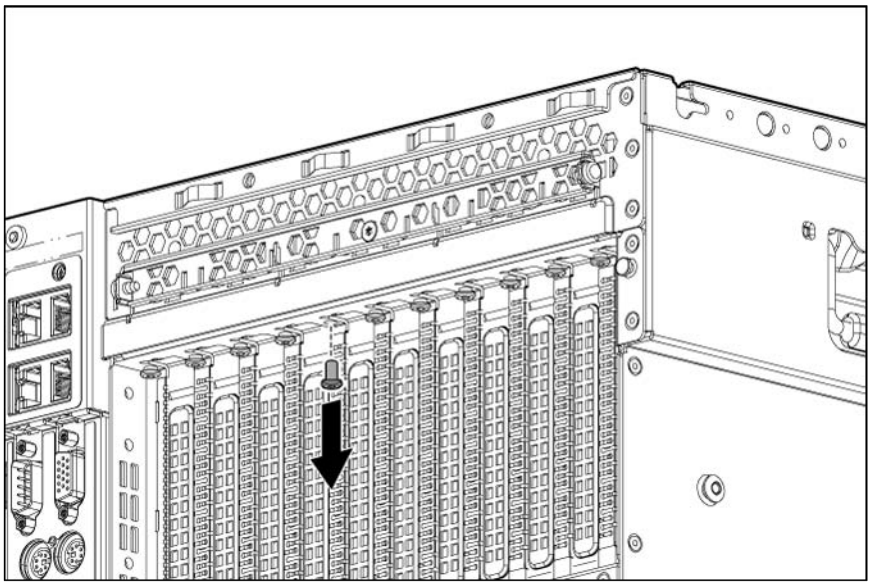
Installing a non-hot-plug expansion board

CAUTION: To prevent improper cooling and thermal damage, do not operate the server unless all expansion slots have either an expansion slot cover or an expansion board installed.

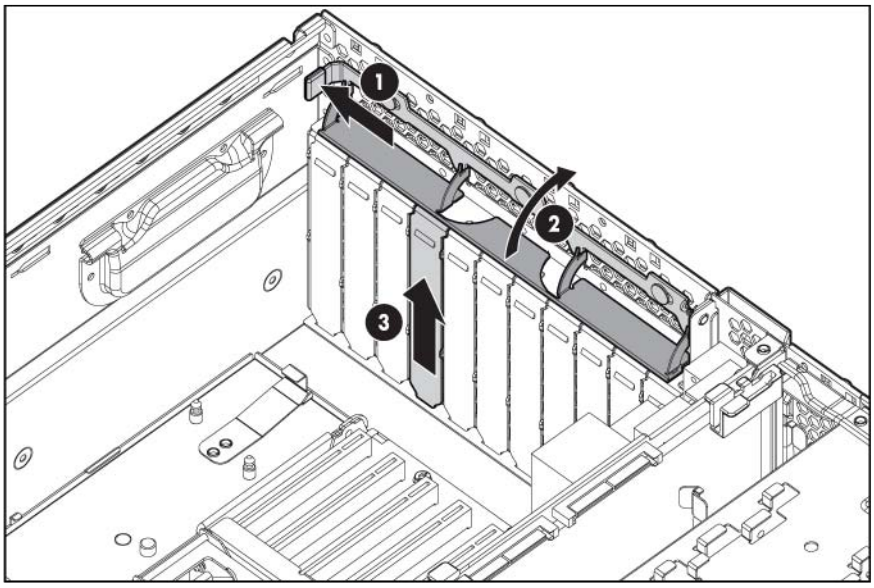
1. Power down the server (on page 22).
2. Extend or remove the server from the rack.
3. Remove the access panel (on page 23).

4. If installed, remove the shipping screws.

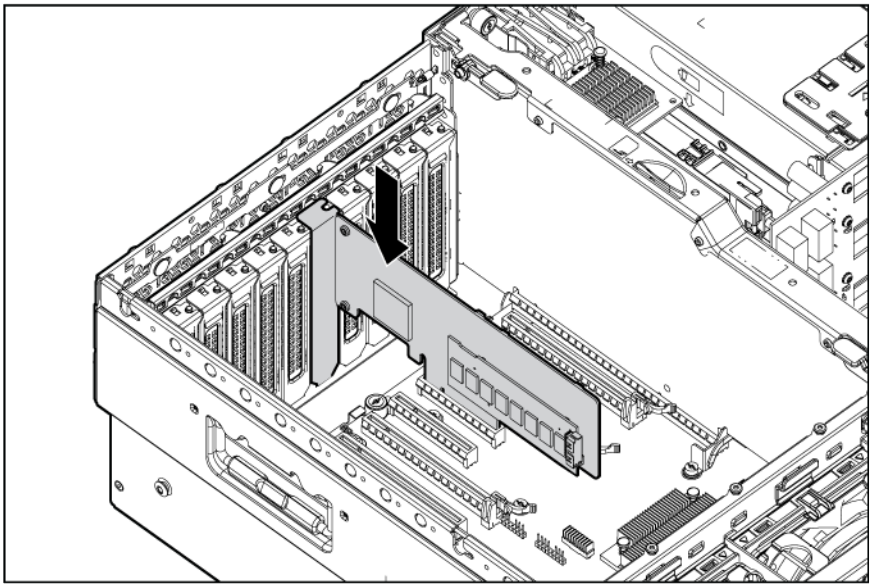




5. Open the expansion board retainer, and then remove the expansion slot cover.



6. Install the expansion board.



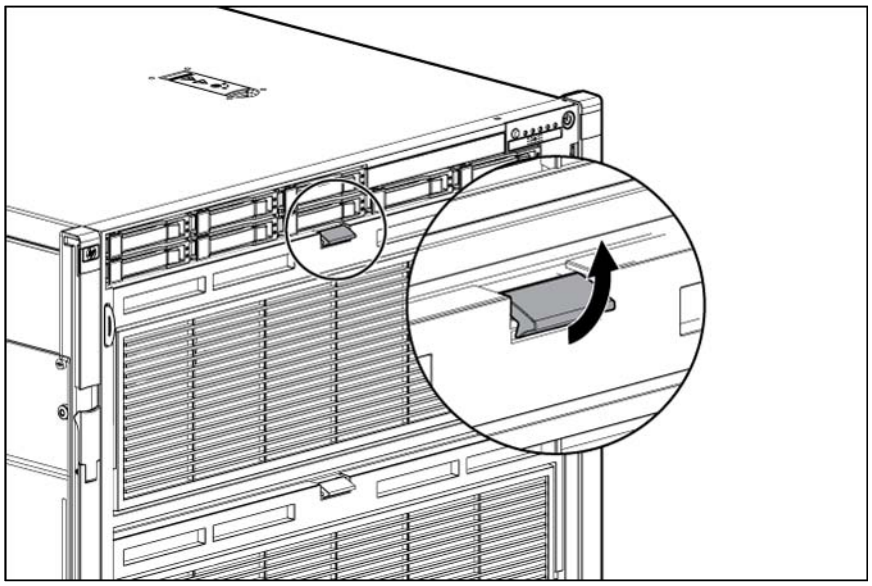
7. Install the shipping screw, if necessary. For more information, see "Securing an expansion board for shipping."
8. Close the expansion slot retainer.
9. Connect any required internal or external cables to the expansion board.
10. Install the access panel.
11. Power up the server (on page 22).
12. Resume normal server operations.

Installing the PCI Express I/O expansion board

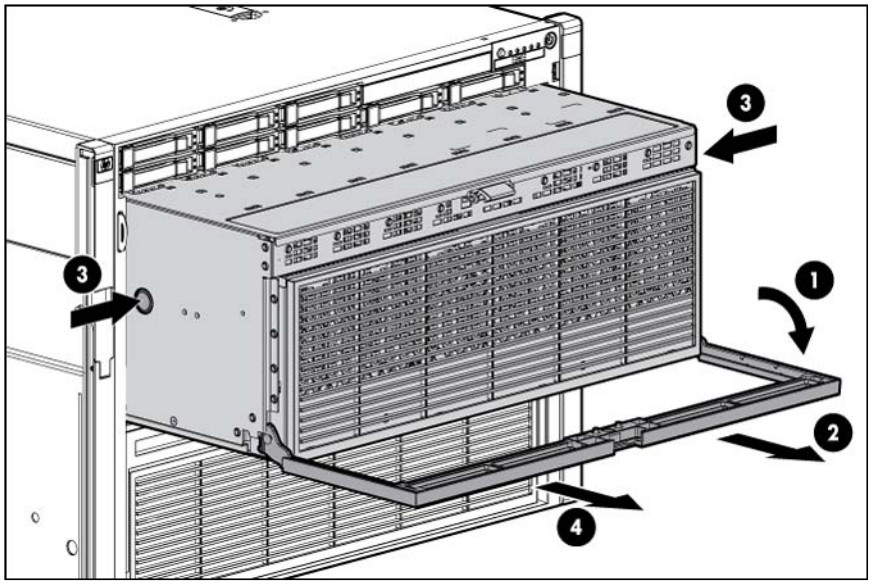
CAUTION: To prevent improper cooling and thermal damage, do not operate the server unless all expansion slots have either an expansion slot cover or an expansion board installed.

IMPORTANT: When either optional I/O expansion board in installed in a two-processor configuration, the second processor must be installed in socket 3.

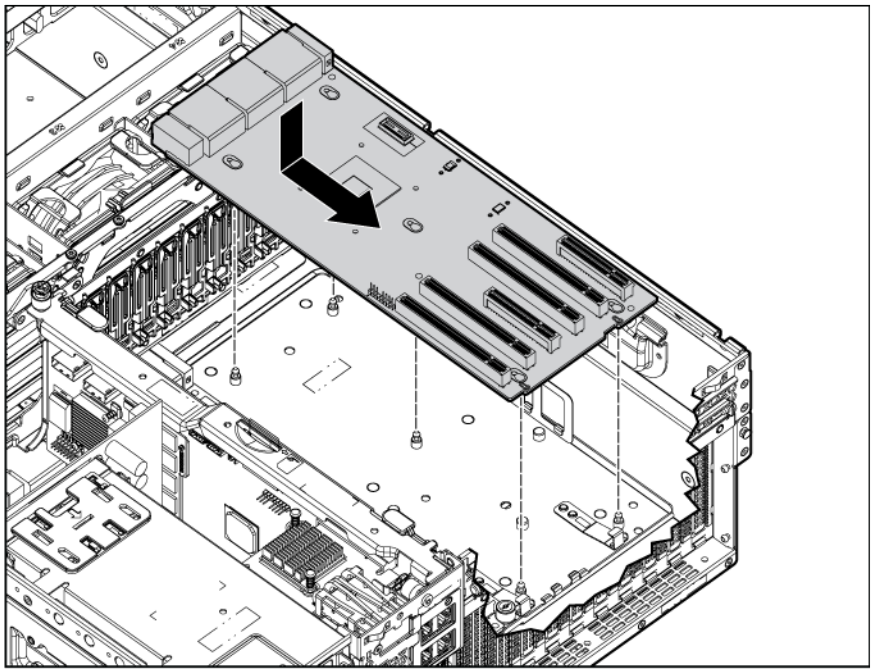
1. Power down the server (on page 22).
2. Extend the server from the rack (on page 22).
3. Remove the access panel (on page 23).
4. Release the latches on the release lever.



5. Lower the handle, and then extend the processor memory drawer from the server until the release latches catch.



6. Install the PCI Express I/O expansion board.



7. Install any expansion boards.
8. Slide the processor memory drawer back into the server.
9. Install the access panel.
10. Slide the server back into the rack.
11. Power up the server (on page 22).

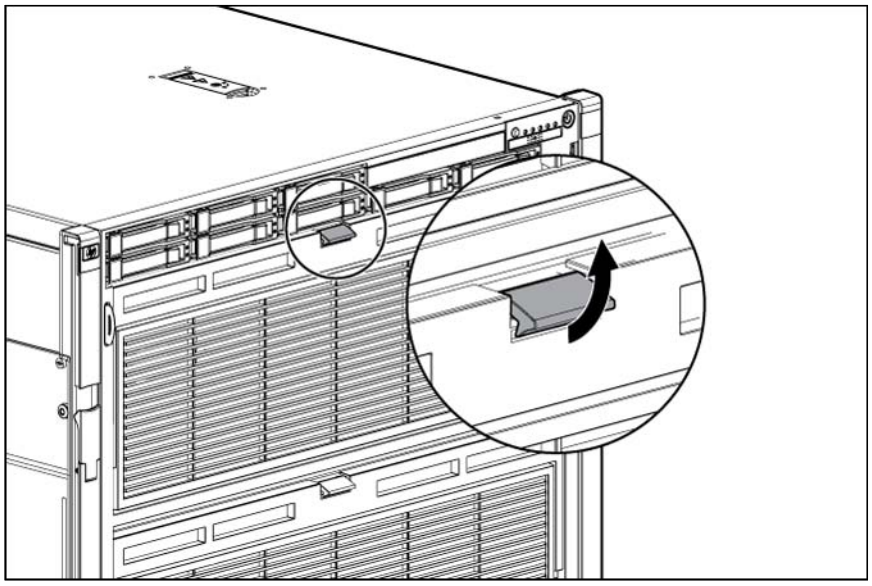
Installing the PCI-X/PCI Express I/O expansion board

CAUTION: To prevent improper cooling and thermal damage, do not operate the server unless all expansion slots have either an expansion slot cover or an expansion board installed.

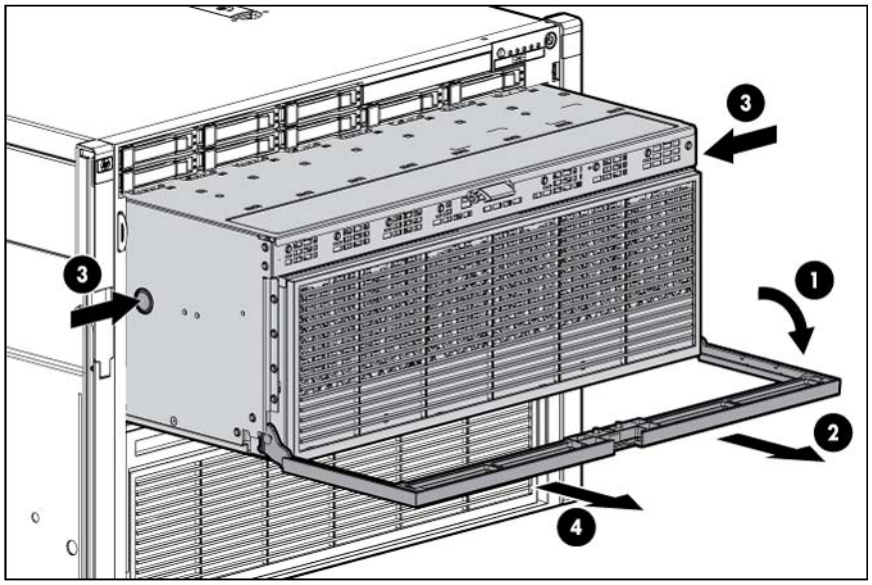
IMPORTANT: When either optional I/O expansion board in installed in a two-processor configuration, the second processor must be installed in socket 3.

1. Power down the server (on page 22).
2. Extend the server from the rack (on page 22).
3. Remove the access panel (on page 23).

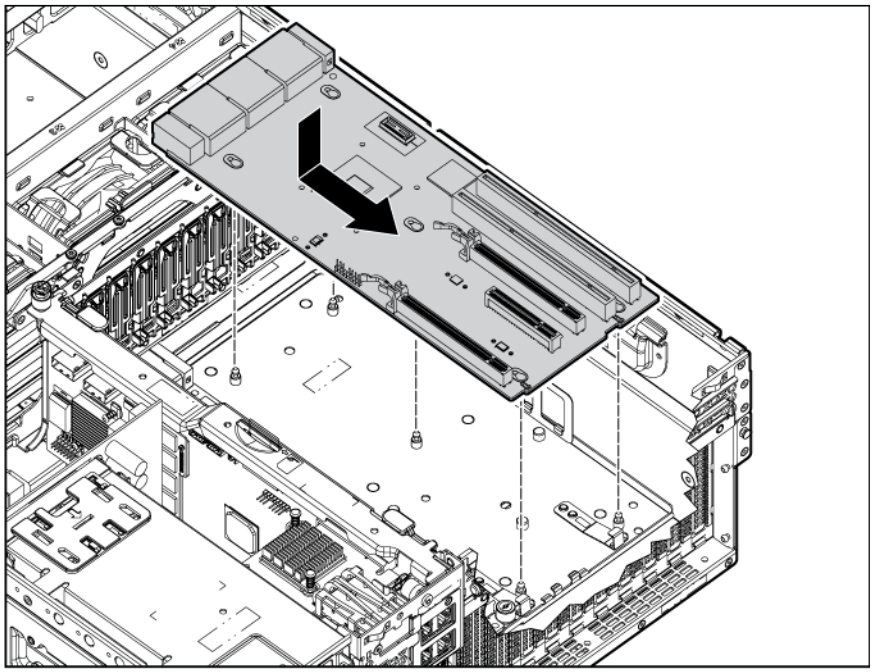
4. Release the latches on the release lever.



5. Lower the handle, and then extend the processor memory drawer from the server until the release latches catch.



6. Install the PCI-X/PCI Express I/O expansion board.

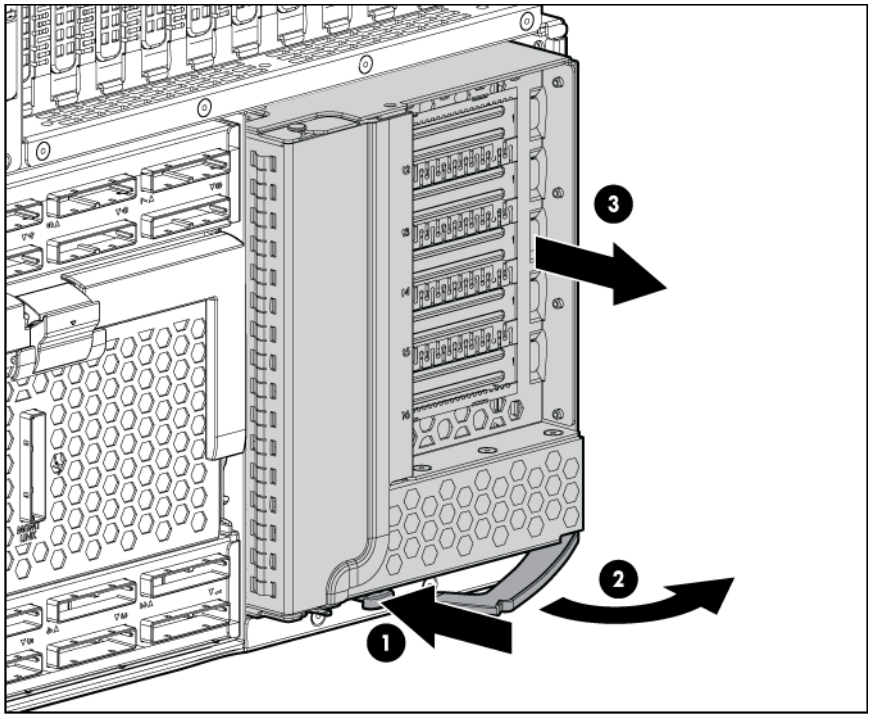


7. Install any expansion boards.
8. Slide the processor memory drawer back into the server.
9. Install the access panel.
10. Slide the server back into the rack.
11. Power up the server (on page 22).

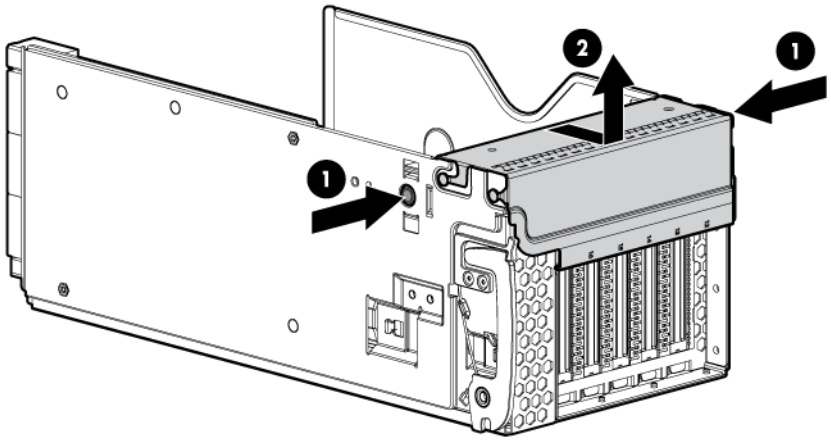
Low profile I/O expander

1. Power down the server (on page 22).
2. Press the release button, and open the lever.

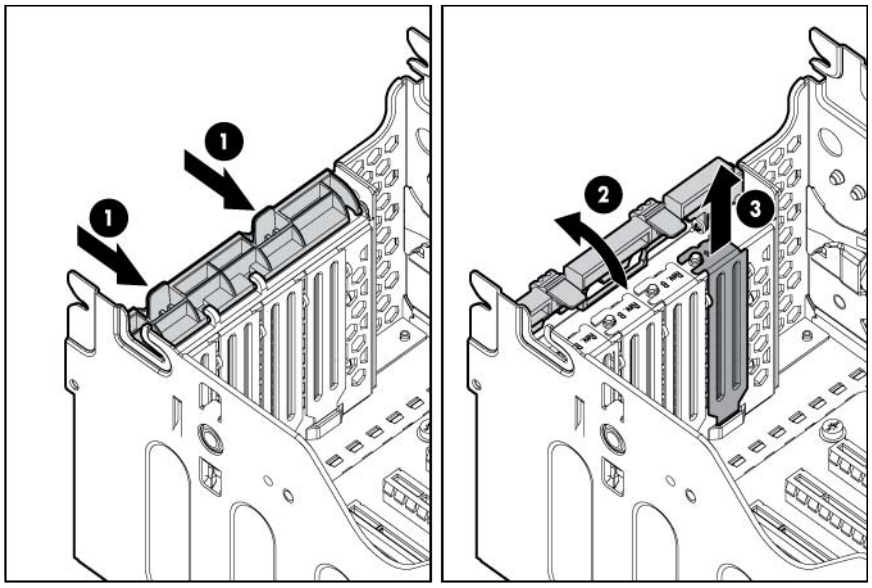
3. Slide the I/O expander out of the server. Place a hand under the component to support it as you remove it from the server.



4. Press the side buttons to remove the component cover.



5. To open the I/O card lock, push the blue tab, flip it back, then open the hinge forward.



6. Remove expansion slot covers as necessary.

To replace the component, reverse the removal procedure.

Battery-backed write cache module

The HP BBWC protects against hard boot, power, controller, and system board failures. The server supports the following battery-backed options:

- 256-MB cache module (standard)
- 512-MB cache module (optional)

The BBWC consists of two parts: a battery pack and a storage cache module.

Along with the cache module, the battery pack provides transportable data protection, increases overall controller performance, and maintains any cached data for up to 72 hours after the server loses power. The NiMH batteries in the battery pack are continuously recharged through a trickle-charging process whenever the system power is on.

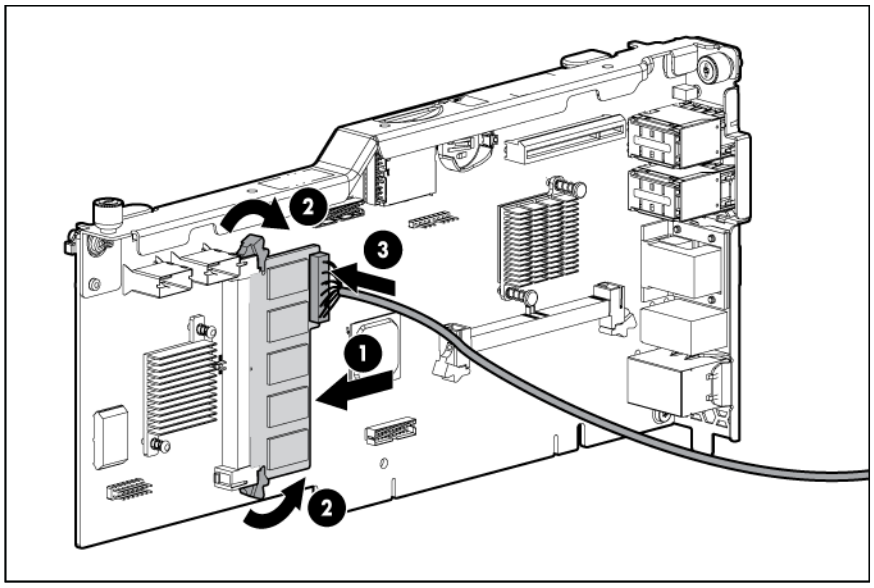
△ **CAUTION:** To prevent a server malfunction or damage to the equipment, do not add or remove the battery pack while an array capacity expansion, RAID level migration, or stripe size migration is in progress.

△ **CAUTION:** After the server is powered down, wait 15 seconds and then check the amber LED before unplugging the cable from the cache module. If the amber LED blinks after 15 seconds, do not remove the cable from the cache module. The cache module is backing up data, and data is lost if the cable is detached.

IMPORTANT: The battery pack might have a low charge when installed. In this case, a POST error message is displayed when the server is powered up, indicating that the battery pack is temporarily disabled. No action is necessary on your part. The internal circuitry automatically recharges the batteries and enables the battery pack. This process might take up to four hours. During this time, the cache module functions properly, but without the performance advantage of the battery pack.

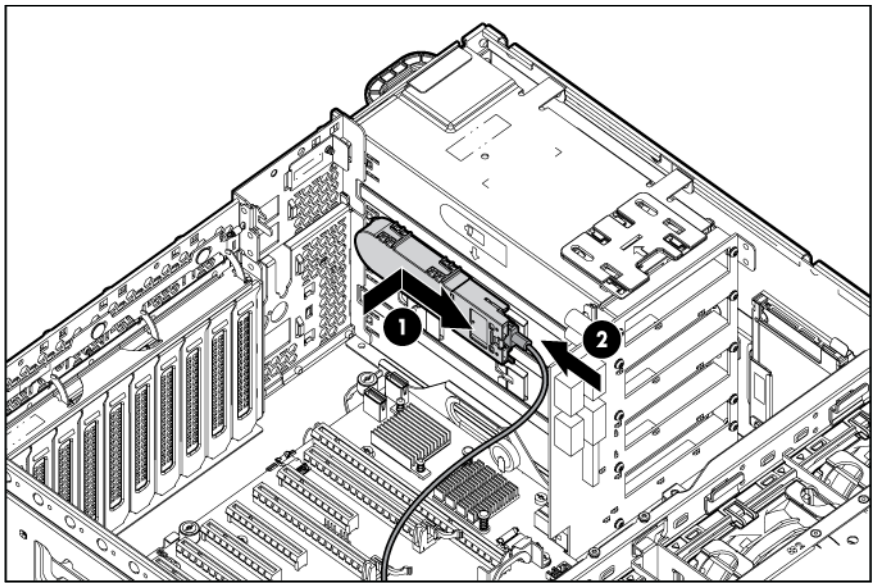
To install the component:

1. Close all applications, and power down the server (on page 22). This procedure flushes all data from the cache.
2. Extend the server from the rack (on page 22).
3. Remove the access panel (on page 23).
4. Remove the SPI board.
5. Install the cache module.
6. Attach the cable to the cache module.



7. Install the battery.
8. Connect the cable to the battery.

The SPI board is not shown for clarity.



9. Install the access panel.
10. Slide the server back into the rack.
11. Power up the server (on page 22).

FBWC module and capacitor pack option

CAUTION: Do not use this controller with cache modules designed for other controller models, because the controller can malfunction and you can lose data. Also, do not transfer this cache module to a different controller module, because you can lose data.

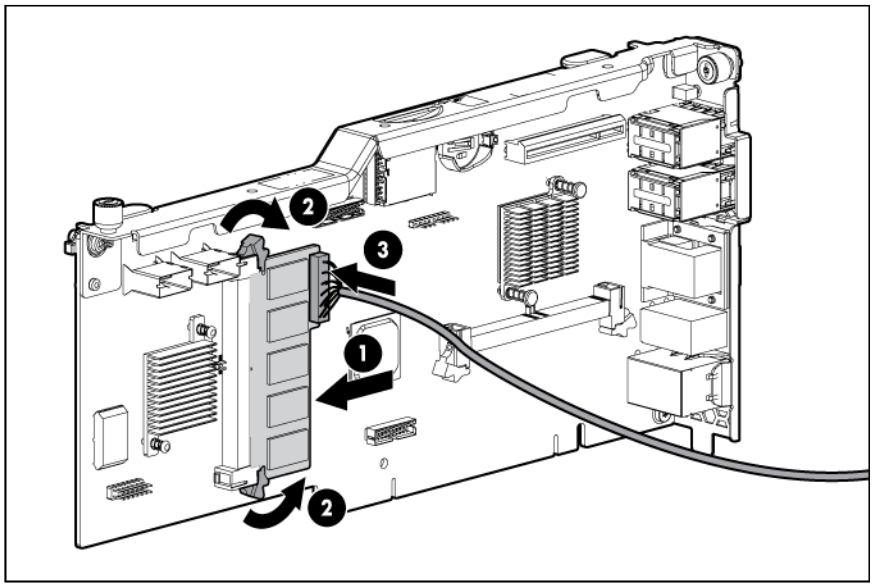
To install the component:

1. Back up all data.
2. Close all applications.
3. Power down the server (on page 22).

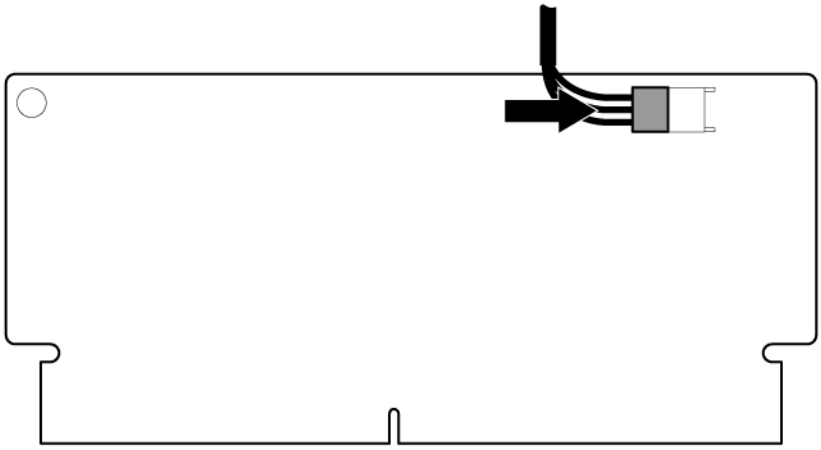
CAUTION: In systems that use external data storage, be sure that the server is the first unit to be powered down and the last to be powered back up. Taking this precaution ensures that the system does not erroneously mark the drives as failed when the server is powered up.

4. Extend the server from the rack (on page 22).
5. Remove the access panel (on page 23).
6. Remove the SPI board.

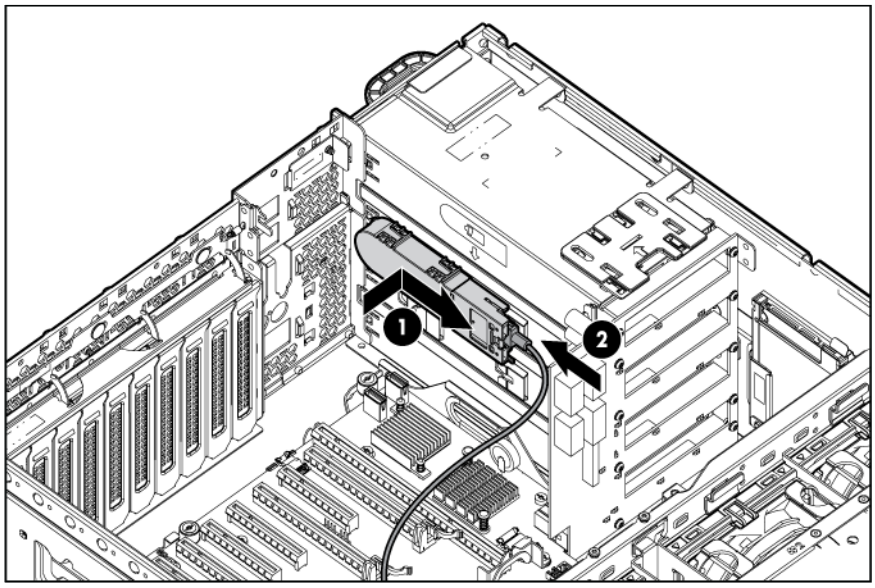
7. Install the FBWC module.



8. Connect the cable.



9. Install the capacitor pack.



10. Install the SPI board.
11. Install the access panel.
12. Slide the server back into the rack.
13. Power up the server (on page 22).

HP Trusted Platform Module option

Use these instructions to install and enable a TPM on a supported server. This procedure includes three sections:

1. Installing the Trusted Platform Module board (on page 71).
2. Retaining the recovery key/password (on page 71).
3. Enabling the Trusted Platform Module (on page 72).

   Enabling the TPM requires accessing the ROM-Based Setup Utility (RBSU) ("HP ROM-Based Setup Utility" on page 77). For more information about RBSU, see the HP website (http://www.hp.com/support/smartstart/documentation).

TPM installation requires the use of drive encryption technology, such as the Microsoft® Windows® BitLocker™ Drive Encryption feature. For more information on BitLocker™, see the Microsoft website (http://www.microsoft.com).

△ **CAUTION:** Always observe the guidelines in this document. Failure to follow these guidelines can cause hardware damage or halt data access.

When installing or replacing a TPM, observe the following guidelines:

- Do not remove an installed TPM. Once installed, the TPM becomes a permanent part of the system board.
- When installing or replacing hardware, HP service providers cannot enable the TPM or the encryption technology. For security reasons, only the customer can enable these features.

- When returning a system board for service replacement, do not remove the TPM from the system board. When requested, HP Service provides a TPM with the spare system board.
- Any attempt to remove an installed TPM from the system board breaks or disfigures the TPM security rivet. Upon locating a broken or disfigured rivet on an installed TPM, administrators should consider the system compromised and take appropriate measures to ensure the integrity of the system data.
- When using BitLocker™, always retain the recovery key/password. The recovery key/password is required to enter Recovery Mode after BitLocker™ detects a possible compromise of system integrity.
- HP is not liable for blocked data access caused by improper TPM use. For operating instructions, see the encryption technology feature documentation provided by the operating system.

Retaining the recovery key/password

The recovery key/password is generated during BitLocker™ setup, and can be saved and printed after BitLocker™ is enabled. When using BitLocker™, always retain the recovery key/password. The recovery key/password is required to enter Recovery Mode after BitLocker™ detects a possible compromise of system integrity.

To help ensure maximum security, observe the following guidelines when retaining the recovery key/password:

- Always store the recovery key/password in multiple locations.
- Always store copies of the recovery key/password away from the server.
- Do not save the recovery key/password on the encrypted hard drive.

Installing the Trusted Platform Module board

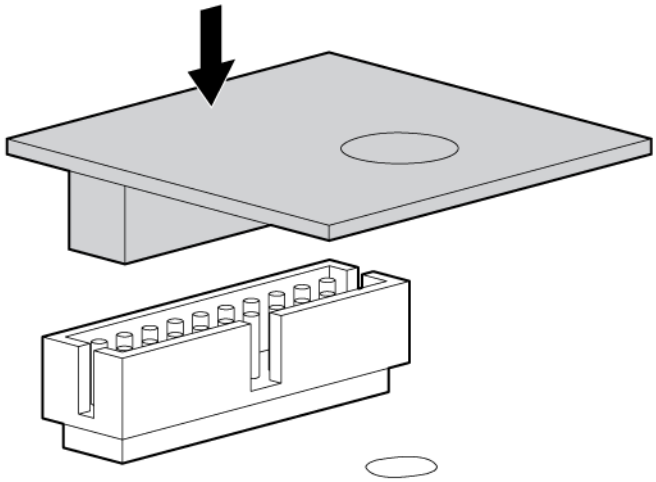
WARNING: To reduce the risk of personal injury, electric shock, or damage to the equipment, remove the power cord to remove power from the server. The front panel Power On/Standby button does not completely shut off system power. Portions of the power supply and some internal circuitry remain active until AC power is removed.

WARNING: To reduce the risk of personal injury from hot surfaces, allow the drives and the internal system components to cool before touching them.

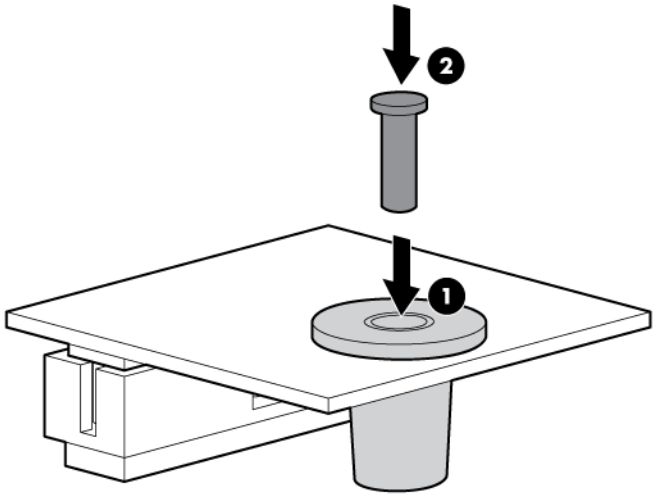
1. Power down the server (on page 22).
2. Remove the access panel (on page 23).
3. Extend the server from the rack (on page 22).
4. Remove the SPI board.
5. Locate the TPM connector.

CAUTION: Any attempt to remove an installed TPM from the system board breaks or disfigures the TPM security rivet. Upon locating a broken or disfigured rivet on an installed TPM, administrators should consider the system compromised and take appropriate measures to ensure the integrity of the system data.

6. Install the TPM board. Press down on the connector to seat the board ("System board components" on page 16).



7. Install the TPM security rivet by pressing the rivet firmly into the system board.



8. Install the SPI board.
9. Install the access panel.
10. Slide the server back into the rack.
11. Power up the server (on page 22).

Enabling the Trusted Platform Module

1. When prompted during the start-up sequence, access RBSU by pressing the **F9** key.
2. From the Main Menu, select **Server Security**.
3. From the Server Security Menu, select **Trusted Platform Module**.
4. From the Trusted Platform Module Menu, select **TPM Functionality**.
5. Select **Enable**, and then press the **Enter** key to modify the TPM Functionality setting.

6. Press the **Esc** key to exit the current menu, or press the **F10** key to exit RBSU.
7. Reboot the server.
8. Enable the TPM in the OS. For OS-specific instructions, see the OS documentation.

> **CAUTION:** When a TPM is installed and enabled on the server, data access is locked if you fail to follow the proper procedures for updating the system or option firmware, replacing the system board, replacing a hard drive, or modifying OS application TPM settings.

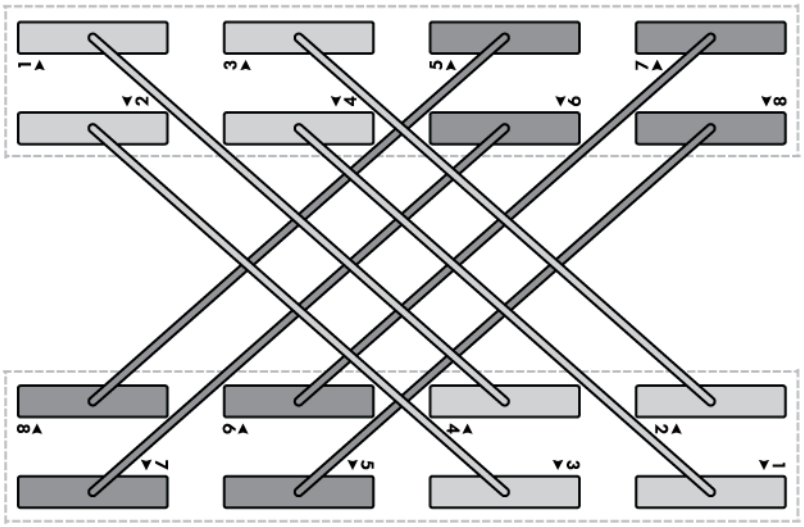
For more information on firmware updates and hardware procedures, see the *HP Trusted Platform Module Best Practices White Paper* on the HP website (http://www.hp.com/support).

For more information on adjusting TPM usage in BitLocker™, see the Microsoft website (http://technet.microsoft.com/en-us/library/cc732774.aspx).

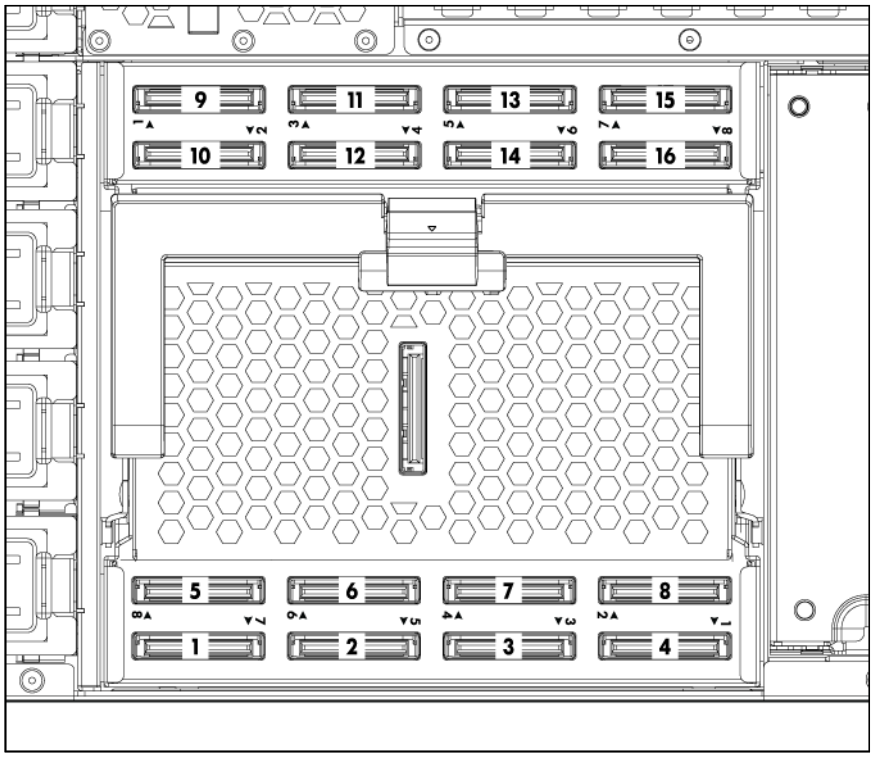
Cabling

XNC cabling

CAUTION: XNC cabling (on page 74) is required for eight processor systems. Failure to cable the XNC will result in the lower processor memory drawer not being recognized by the server.



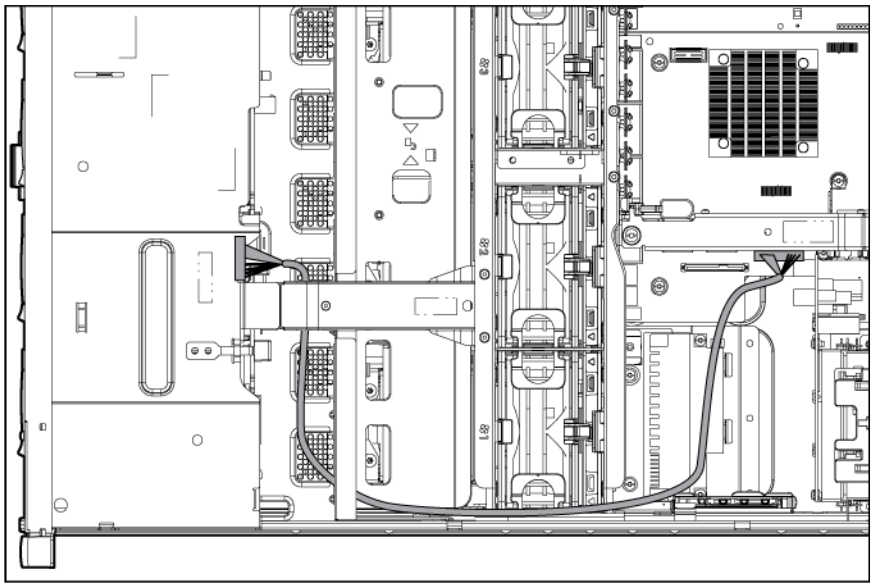
For best cable management, follow the recommend connection order.



1. Make connections labeled 1 through 8 in the illustration.
2. Refer to cabling illustrations and table to make connections 9 though 16. For example, to make the ninth connection, to upper board 1, use the cable connected to lower board 4.

Connection sequence	Board	Number	Connects to	Connection sequence	Board	Number
Seventh	Lower	4	Connects	Ninth	Upper	1
Third	Lower	3	Connects	Tenth	Upper	2
Eighth	Lower	2	Connects	Eleventh	Upper	3
Fourth	Lower	1	Connects	Twelfth	Upper	4
Fifth	Lower	8	Connects	Thirteenth	Upper	5
First	Lower	7	Connects	Fourteenth	Upper	6
Sixth	Lower	6	Connects	Fifteenth	Upper	7
Second	Lower	5	Connects	Sixteenth	Upper	8

DVD-ROM drive cabling



Server software and configuration utilities

Configuration tools

SmartStart software

SmartStart is a collection of software that optimizes single-server setup, providing a simple and consistent way to deploy server configuration. SmartStart has been tested on many ProLiant server products, resulting in proven, reliable configurations.

SmartStart assists the deployment process by performing a wide range of configuration activities, including:

- Preparing the system for installing "off-the-shelf" versions of leading operating system software
- Installing optimized server drivers, management agents, and utilities automatically with every assisted installation
- Testing server hardware using the Insight Diagnostics Utility ("HP Insight Diagnostics" on page 85)
- Installing software drivers directly from the CD. With systems that have Internet connection, the SmartStart Autorun Menu provides access to a complete list of ProLiant system software.
- Enabling access to the Array Configuration Utility (on page 80) and Erase Utility (on page 83)

SmartStart is included in the HP Insight Foundation suite for ProLiant. For more information about SmartStart software, see the HP Insight Foundation suite for ProLiant or the HP website (http://www.hp.com/go/foundation).

SmartStart Scripting Toolkit

The SmartStart Scripting Toolkit is a server deployment product that allows you to build an unattended automated installation for high-volume server deployments. The SmartStart Scripting Toolkit is designed to support ProLiant BL, ML, DL, and SL servers. The toolkit includes a modular set of utilities and important documentation that describes how to apply these tools to build an automated server deployment process.

The Scripting Toolkit provides a flexible way to create standard server configuration scripts. These scripts are used to automate many of the manual steps in the server configuration process. This automated server configuration process cuts time from each deployment, making it possible to scale rapid, high-volume server deployments.

For more information, and to download the SmartStart Scripting Toolkit, see the HP website (http://www.hp.com/servers/sstoolkit).

HP ROM-Based Setup Utility

RBSU is a configuration utility embedded in ProLiant servers that performs a wide range of configuration activities that can include the following:

- Configuring system devices and installed options

- Enabling and disabling system features
- Displaying system information
- Selecting the primary boot controller
- Configuring memory options
- Language selection

For more information on RBSU, see the *HP ROM-Based Setup Utility User Guide* on the Documentation CD or the HP website (http://www.hp.com/support/smartstart/documentation).

Using RBSU

To use RBSU, use the following keys:

- To access RBSU, press the **F9** key during power-up when prompted.
- To navigate the menu system, use the arrow keys.
- To make selections, press the **Enter** key.
- To access Help for a highlighted configuration option, press the **F1** key.

IMPORTANT: RBSU automatically saves settings when you press the **Enter** key. The utility does not prompt you for confirmation of settings before you exit the utility. To change a selected setting, you must select a different setting and press the **Enter** key.

Default configuration settings are applied to the server at one of the following times:

- Upon the first system power-up
- After defaults have been restored

Default configuration settings are sufficient for proper typical server operation, but configuration settings can be modified using RBSU. The system will prompt you for access to RBSU with each power-up.

Auto-configuration process

The auto-configuration process automatically runs when you boot the server for the first time. During the power-up sequence, the system ROM automatically configures the entire system without needing any intervention. During this process, the ORCA utility, in most cases, automatically configures the array to a default setting based on the number of drives connected to the server.

NOTE: The server may not support all the following examples.

NOTE: If the boot drive is not empty or has been written to in the past, ORCA does not automatically configure the array. You must run ORCA to configure the array settings.

Drives installed	Drives used	RAID level
1	1	RAID 0
2	2	RAID 1
3, 4, 5, or 6	3, 4, 5, or 6	RAID 5
More than 6	0	None

To change any ORCA default settings and override the auto-configuration process, press the **F8** key when prompted.

By default, the auto-configuration process configures the system for the English language. To change any default settings in the auto-configuration process (such as the settings for language, operating system, and primary boot controller), execute RBSU by pressing the **F9** key when prompted. After the settings are selected, exit RBSU and allow the server to reboot automatically.

For more information on RBSU, see the *HP ROM-Based Setup Utility User Guide* on the Documentation CD or the HP website (http://www.hp.com/support/smartstart/documentation).

Boot options

Near the end of the boot process, the boot options screen is displayed. This screen is visible for several seconds before the system attempts to boot from a supported boot device. During this time, you can do the following:

- Access RBSU by pressing the **F9** key.
- Access the System Maintenance Menu (which enables you to launch ROM-based Diagnostics or Inspect) by pressing the **F10** key.
- Force a PXE Network boot by pressing the **F12** key.

BIOS Serial Console

BIOS Serial Console allows you to configure the serial port to view POST error messages and run RBSU remotely through a serial connection to the server COM port. The server that you are remotely configuring does not require a keyboard and mouse.

For more information about BIOS Serial Console, see the *BIOS Serial Console User Guide* on the Documentation CD or the HP website (http://www.hp.com/support/smartstart/documentation).

Configuring lockstep memory

To configure Lockstep memory:

1. Install the required DIMMs.
2. Access RBSU by pressing the **F9** key during power-up when the prompt is displayed.
3. Select **System Options**.
4. Select **Advanced Memory Protection**.
5. Select **Lockstep with Advanced ECC Support**.
6. Press the **Enter** key.
7. Press the **Esc** key to exit the current menu, or press the **F10** key to exit RBSU.

For more information on Lockstep memory, see the white paper on the HP website (http://h18000.www1.hp.com/products/servers/technology/memoryprotection.html).

Configuring online spare memory

To configure online spare memory:

1. Install the required DIMMs.

2. When the prompt appears, access RBSU by pressing the **F9** key during power-up.
3. Select **System Options**.
4. Select **Advanced Memory Protection**.
5. Select **Online Spare with Advanced ECC Support**.
6. Press the **Enter** key.
7. Press the **Esc** key to exit the current menu, or press the **F10** key to exit RBSU.

For more information on online spare memory, see the HP website (http://h18000.www1.hp.com/products/servers/technology/memoryprotection.html).

Configuring mirrored memory

To configure mirrored memory:

1. Install the required DIMMs.
2. Access RBSU by pressing the **F9** key during power-up when the prompt is displayed.
3. Select **System Options**.
4. Select **Advanced Memory Protection**.
5. Select **Mirrored Memory with Advanced ECC Support**.
6. Press the **Enter** key.
7. Press the **Esc** key to exit the current menu or press the **F10** key to exit RBSU.

For more information on mirrored memory, see the white paper on the HP website (http://h18000.www1.hp.com/products/servers/technology/memoryprotection.html).

Array Configuration Utility

ACU is a browser-based utility with the following features:

- Runs as a local application or remote service
- Supports online array capacity expansion, logical drive extension, assignment of online spares, and RAID or stripe size migration
- Suggests the optimum configuration for an unconfigured system
- Provides different operating modes, enabling faster configuration or greater control over the configuration options
- Remains available any time that the server is on
- Displays on-screen tips for individual steps of a configuration procedure
- Beginning with ACU version 8.28.13.0, provides diagnostic functionality on the Diagnostics tab (formerly known as Array Diagnostics Utility).

For optimum performance, the minimum display settings are 1024 × 768 resolution and 16-bit color. Servers running Microsoft® operating systems require one of the following supported browsers:

- Internet Explorer 6.0 or later
- Mozilla Firefox 2.0 or later

For Linux servers, see the README.TXT file for additional browser and support information.

For more information, see the *Configuring Arrays on HP Smart Array Controllers Reference Guide* on the Documentation CD or the HP website (http://www.hp.com).

HP Insight Control server deployment (formerly RDP)

HP Insight Control is essential server management that unlocks the management capabilities built into HP ProLiant servers. Insight Control delivers powerful capabilities that enable customers to proactively manage ProLiant server health - whether physical or virtual, deploy ProLiant servers quickly, optimize power consumption, and control ProLiant servers from anywhere.

HP Insight Control server deployment is a key component of Insight Control which provides an automated, simple-to-use solution for bare-metal deployment and configuration of HP ProLiant servers with an operating system or virtualization platform. Insight Control server deployment includes an unaltered Altiris Deployment Solution while providing optimization for deployment of HP ProLiant servers using HP ProLiant Integration Module.

HP Insight Control facilitates the installation, configuration, and deployment of high-volumes of servers through an intuitive, comprehensive console, using either scripting or imaging technology. It makes deploying a server as easy as selecting one, a few, or hundreds of target servers, selecting predefined images or scripts, and clicking **Run**.

For more information about HP Insight Control, see the HP website (http://www.hp.com/go/insightcontrol).

Option ROM Configuration for Arrays

Before installing an operating system, you can use the ORCA utility to create the first logical drive, assign RAID levels, and establish online spare configurations.

The utility also provides support for the following functions:

- Reconfiguring one or more logical drives
- Viewing the current logical drive configuration
- Deleting a logical drive configuration
- Setting the controller to be the boot controller

If you do not use the utility, ORCA will default to the standard configuration.

For more information regarding array controller configuration, refer to the controller user guide.

For more information regarding the default configurations that ORCA uses, refer to the *HP ROM-Based Setup Utility User Guide* on the Documentation CD.

Re-entering the server serial number and product ID

After you replace the system board, you must re-enter the server serial number and the product ID.

1. During the server startup sequence, press the **F9** key to access RBSU.
2. Select the **Advanced Options** menu.
3. Select **Service Options**.
4. Select **Serial Number**. The following warnings appear:

```
WARNING! WARNING! WARNING! The serial number is loaded into the system during
the manufacturing process and should NOT be modified. This option should only
be used by qualified service personnel. This value should always match the
serial number sticker located on the chassis.
Warning: The serial number should ONLY be modified by qualified personnel.
This value should always match the serial number located on the chassis.
```

5. Press the **Enter** key to clear the warning.
6. Enter the serial number and press the **Enter** key.
7. Select **Product ID**. The following warning appears:

   ```
   Warning: The Product ID should ONLY be modified by qualified personnel. This
   value should always match the Product ID on the chassis.
   ```

8. Enter the product ID and press the **Enter** key.
9. Press the **Esc** key to close the menu.
10. Press the **Esc** key to exit RBSU.
11. Press the **F10** key to confirm exiting RBSU. The server automatically reboots.

Management tools

Automatic Server Recovery

ASR is a feature that causes the system to restart when a catastrophic operating system error occurs, such as a blue screen, ABEND (does not apply to HP ProLiant DL980 Servers), or panic. A system fail-safe timer, the ASR timer, starts when the System Management driver, also known as the Health Driver, is loaded. When the operating system is functioning properly, the system periodically resets the timer. However, when the operating system fails, the timer expires and restarts the server.

ASR increases server availability by restarting the server within a specified time after a system hang. At the same time, the HP SIM console notifies you by sending a message to a designated pager number that ASR has restarted the system. You can disable ASR from the HP SIM console or through RBSU.

ROMPaq utility

The ROMPaq utility enables you to upgrade the system firmware (BIOS). To upgrade the firmware, insert a ROMPaq USB Key into an available USB port and boot the system. In addition to ROMPaq, Online Flash Components for Windows and Linux operating systems are available for updating the system firmware.

The ROMPaq utility checks the system and provides a choice (if more than one exists) of available firmware revisions.

For more information, see the Download drivers and software page for the server. To access the server-specific page, enter the following web address into the browser:

http://www.hp.com/support/*<servername>*

For example:

http://www.hp.com/support/dl360g6

System Online ROM flash component utility

The Online ROM Flash Component Utility enables system administrators to efficiently upgrade system or controller ROM images across a wide range of servers and array controllers. This tool has the following features:

- Works offline and online
- Supports Microsoft® Windows NT®, Windows® 2000, Windows Server® 2003, Novell Netware, and Linux operating systems

> **IMPORTANT:** This utility supports operating systems that may not be supported by the server. For operating systems supported by the server, see the HP website (http://www.hp.com/support).

- Integrates with other software maintenance, deployment, and operating system tools
- Automatically checks for hardware, firmware, and operating system dependencies, and installs only the correct ROM upgrades required by each target server

To download the tool and for more information, see the HP website (http://www.hp.com/support).

iLO 3 technology

The iLO 3 subsystem is a standard component of selected ProLiant servers that provides server health and remote server manageability. The iLO 3 subsystem includes an intelligent microprocessor, secure memory, and a dedicated network interface. This design makes iLO 3 independent of the host server and its operating system. The iLO 3 subsystem provides remote access to any authorized network client, sends alerts, and provides other server management functions.

Using iLO 3, you can:

- Remotely power up, power down, or reboot the host server.
- Send alerts from iLO 3 regardless of the state of the host server.
- Access advanced troubleshooting features through the iLO 3 interface.
- Diagnose iLO 3 using HP SIM through a web browser and SNMP alerting.

For more information about iLO 3 features (which may require an iLO Advanced Pack or iLO Advanced for BladeSystem license), see the iLO 3 documentation on the Documentation CD or on the HP website (http://www.hp.com/servers/lights-out).

Erase Utility

> **CAUTION:** Perform a backup before running the System Erase Utility. The utility sets the system to its original factory state, deletes the current hardware configuration information, including array setup and disk partitioning, and erases all connected hard drives completely. Refer to the instructions for using this utility.

Run the Erase Utility if you must erase the system for the following reasons:

- You want to install a new operating system on a server with an existing operating system.
- You encounter an error when completing the steps of a factory-installed operating system installation.

To access the Erase Utility, use the System Erase button on the home screen of the SmartStart CD ("SmartStart software" on page 77).

StorageWorks library and tape tools

HP StorageWorks L&TT provides functionality for firmware downloads, verification of device operation, maintenance procedures, failure analysis, corrective service actions, and some utility functions. It also provides seamless integration with HP hardware support by generating and emailing support tickets that deliver a snapshot of the storage system.

For more information, and to download the utility, refer to the StorageWorks L&TT website (http://h18006.www1.hp.com/products/storageworks/ltt).

HP Systems Insight Manager

HP SIM is a web-based application that allows system administrators to accomplish normal administrative tasks from any remote location, using a web browser. HP SIM provides device management capabilities that consolidate and integrate management data from HP and third-party devices.

IMPORTANT: You must install and use HP SIM to benefit from the Pre-Failure Warranty for processors, SAS and SATA hard drives, and memory modules.

For additional information, refer to the Management CD in the HP ProLiant Essentials Foundation Pack or the HP SIM website (http://www.hp.com/go/hpsim).

Management Agents

Management Agents provide the information to enable fault, performance, and configuration management. The agents allow easy manageability of the server through HP SIM software, and third-party SNMP management platforms. Management Agents are installed with every SmartStart assisted installation or can be installed through the HP PSP. The Systems Management homepage provides status and direct access to in-depth subsystem information by accessing data reported through the Management Agents. For additional information, refer to the Management CD in the HP ProLiant Essentials Foundation Pack or the HP website (http://www.hp.com/servers/manage).

Redundant ROM support

The server enables you to upgrade or configure the ROM safely with redundant ROM support. The server has an 8-MB ROM that acts as two, separate 4-MB ROMs. In the standard implementation, one side of the ROM contains the current ROM program version, while the other side of the ROM contains a backup version.

NOTE: The server ships with the same version programmed on each side of the ROM.

Safety and security benefits

When you flash the system ROM, ROMPaq writes over the backup ROM and saves the current ROM as a backup, enabling you to switch easily to the alternate ROM version if the new ROM becomes corrupted for any reason. This feature protects the existing ROM version, even if you experience a power failure while flashing the ROM.

USB support

HP provides both standard USB support and legacy USB support. Standard support is provided by the OS through the appropriate USB device drivers. Before the OS loads, HP provides support for USB devices through legacy USB support, which is enabled by default in the system ROM.

Legacy USB support provides USB functionality in environments where USB support is not available normally. Specifically, HP provides legacy USB functionality for the following:

- POST
- RBSU
- Diagnostics
- DOS
- Operating environments which do not provide native USB support

Diagnostic tools

HP Insight Diagnostics

HP Insight Diagnostics is a proactive server management tool, available in both offline and online versions, that provides diagnostics and troubleshooting capabilities to assist IT administrators who verify server installations, troubleshoot problems, and perform repair validation.

HP Insight Diagnostics Offline Edition performs various in-depth system and component testing while the OS is not running. To run this utility, launch the SmartStart CD.

HP Insight Diagnostics Online Edition is a web-based application that captures system configuration and other related data needed for effective server management. Available in Microsoft® Windows® and Linux versions, the utility helps to ensure proper system operation.

For more information or to download the utility, refer to the HP website (http://www.hp.com/servers/diags).

HP Insight Diagnostics survey functionality

HP Insight Diagnostics (on page 85) provides survey functionality that gathers critical hardware and software information on ProLiant servers.

This functionality supports operating systems that may not be supported by the server. For operating systems supported by the server, see the HP website (http://www.hp.com/go/supportos).

If a significant change occurs between data-gathering intervals, the survey function marks the previous information and overwrites the survey data files to reflect the latest changes in the configuration.

Survey functionality is installed with every SmartStart-assisted HP Insight Diagnostics installation, or it can be installed through the HP PSP ("ProLiant Support Packs" on page 87).

NOTE: The current version of SmartStart provides the memory spare part numbers for the server. To download the latest version, see the HP website (http://www.hp.com/support).

Integrated Management Log

The IML records hundreds of events and stores them in an easy-to-view form. The IML timestamps each event with 1-minute granularity.

You can view recorded events in the IML in several ways, including the following:

- From within HP SIM ("HP Systems Insight Manager" on page 84)
- From within Survey Utility
- From within operating system-specific IML viewers
  - For NetWare: IML Viewer (does not apply to HP ProLiant DL980 Servers)
  - For Windows®: IML Viewer
  - For Linux: IML Viewer Application
- From within the iLO 3 user interface
- From within HP Insight Diagnostics (on page 85)

For more information, see the Management CD in the HP Insight Foundation suite for ProLiant.

Array Diagnostic Utility

The HP Array Diagnostics Utility is a web-based application that creates a report of all HP storage controllers and disk drives. This report provides vital information to assist in identifying faults or conditions that may require attention. ADU can be accessed from the SmartStart CD ("SmartStart software" on page 77) or downloaded from the HP website (http://www.hp.com).

Remote support and analysis tools

HP Insight Remote Support software

HP strongly recommends that you install HP Insight Remote Support software to complete the installation or upgrade of your product and to enable enhanced delivery of your HP Warranty, HP Care Pack Service, or HP contractual support agreement. HP Insight Remote Support supplements your monitoring 24 x 7 to ensure maximum system availability by providing intelligent event diagnosis, and automatic, secure submission of hardware event notifications to HP, which will initiate a fast and accurate resolution, based on your product's service level. Notifications may be sent to your authorized HP Channel Partner for on-site service, if configured and available in your country. The software is available in two variants:

- HP Insight Remote Support Standard: This software supports server and storage devices and is optimized for environments with 1–50 servers. Ideal for customers who can benefit from proactive notification but do not need proactive service delivery and integration with a management platform.
- HP Insight Remote Support Advanced: This software provides comprehensive remote monitoring and proactive service support for nearly all HP servers, storage, network, and SAN environments, plus selected non-HP servers that have a support obligation with HP. It is integrated with HP Systems Insight Manager. A dedicated server is recommended to host both HP Systems Insight Manager and HP Insight Remote Support Advanced.

Details for both versions are available on the HP website (http://www.hp.com/go/insightremotesupport).

To download the software, go to Software Depot (http://www.software.hp.com).

Select **Insight Remote Support** from the menu on the right.

Keeping the system current

Drivers

The server includes new hardware that may not have driver support on all operating system installation media.

If you are installing a SmartStart-supported operating system, use the SmartStart software (on page 77) and its Assisted Path feature to install the operating system and latest driver support.

NOTE: If you are installing drivers from the SmartStart CD or the Software Maintenance CD, refer to the SmartStart website (http://www.hp.com/servers/smartstart) to be sure that you are using the latest version of SmartStart. For more information, refer to the documentation provided with the SmartStart CD.

If you do not use the SmartStart CD to install an operating system, drivers for some of the new hardware are required. These drivers, as well as other option drivers, ROM images, and value-add software can be downloaded from the HP website (http://www.hp.com/support).

IMPORTANT: Always perform a backup before installing or updating device drivers.

Version control

The VCRM and VCA are Web-enabled Insight Management Agents tools that HP SIM uses to facilitate and schedule software update tasks to the entire enterprise.

- VCRM manages the repository for Windows and Linux PSPs as well as online firmware. Administrators can browse a graphical view of the PSPs or configure VCRM to automatically update the repository with Internet downloads of the latest software from HP.
- VCA compares installed software versions and available updates. Administrators can configure VCA to point to a repository managed by VCRM.

For more information about version control tools, see the *HP Systems Insight Manager Help Guide* and the *Version Control User Guide* on the HP Systems Insight Manager website (http://www.hp.com/go/hpsim).

ProLiant Support Packs

PSPs represent operating system-specific bundles of ProLiant optimized drivers, utilities, and management agents. Refer to the PSP website (http://h18000.www1.hp.com/products/servers/management/psp.html).

Operating system version support

Refer to the operating system support matrix (http://www.hp.com/go/supportos).

System Online ROM flash component utility

The Online ROM Flash Component Utility enables system administrators to efficiently upgrade system or controller ROM images across a wide range of servers and array controllers. This tool has the following features:

- Works offline and online
- Supports Windows Server® 2003, Windows Server® 2008, Novell Netware, and Linux operating systems

  IMPORTANT: This utility supports operating systems that may not be supported by the server. For operating systems supported by the server, see the HP website (http://www.hp.com/support).

- Integrates with other software maintenance, deployment, and operating system tools
- Automatically checks for hardware, firmware, and operating system dependencies, and installs only the correct ROM upgrades required by each target server

To download the tool and for more information, see the HP website (http://www.hp.com/support).

Change control and proactive notification

HP offers Change Control and Proactive Notification to notify customers 30 to 60 days in advance of upcoming hardware and software changes on HP commercial products.

For more information, refer to the HP website (http://www.hp.com/go/pcn).

Care Pack

HP Care Pack Services offer upgraded service levels to extend and expand bundled services with easy-to-buy, easy-to-use support packages that help you make the most of your server investments. For more information, see the HP website (http://www.hp.com/services/carepack).

Battery replacement

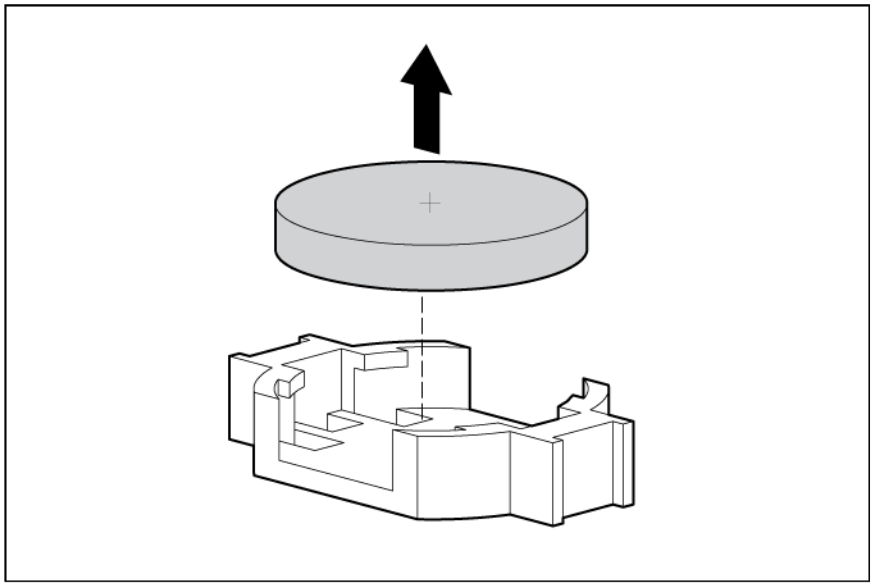
If the server no longer automatically displays the correct date and time, you may need to replace the battery that provides power to the real-time clock.

⚠ **WARNING:** The computer contains an internal lithium manganese dioxide, a vanadium pentoxide, or an alkaline battery pack. A risk of fire and burns exists if the battery pack is not properly handled. To reduce the risk of personal injury:

- Do not attempt to recharge the battery.
- Do not expose the battery to temperatures higher than 60°C (140°F).
- Do not disassemble, crush, puncture, short external contacts, or dispose of in fire or water.
- Replace only with the spare designated for this product.

To remove the component:

1. Power down the server (on page 22).
2. Extend the server from the rack (on page 22).
3. Remove the access panel (on page 23).
4. Locate the battery.
5. Remove the battery.



To replace the component, reverse the removal procedure.

For more information about battery replacement or proper disposal, contact an authorized reseller or an authorized service provider.

Troubleshooting

Troubleshooting resources

The *HP ProLiant Servers Troubleshooting Guide* provides procedures for resolving common problems and comprehensive courses of action for fault isolation and identification, error message interpretation, issue resolution, and software maintenance on ProLiant servers and server blades. This guide includes problem-specific flowcharts to help you navigate complex troubleshooting processes. To view the guide, select a language:

- English (http://www.hp.com/support/ProLiant_TSG_en)
- French (http://www.hp.com/support/ProLiant_TSG_fr)
- Italian (http://www.hp.com/support/ProLiant_TSG_it)
- Spanish (http://www.hp.com/support/ProLiant_TSG_sp)
- German (http://www.hp.com/support/ProLiant_TSG_gr)
- Dutch (http://www.hp.com/support/ProLiant_TSG_nl)
- Japanese (http://www.hp.com/support/ProLiant_TSG_jp)

Pre-diagnostic steps

WARNING: To avoid potential problems, ALWAYS read the warnings and cautionary information in the server documentation before removing, replacing, reseating, or modifying system components.

IMPORTANT: This guide provides information for multiple servers. Some information may not apply to the server you are troubleshooting. Refer to the server documentation for information on procedures, hardware options, software tools, and operating systems supported by the server.

1. Review the important safety information (on page 90).
2. Gather symptom information (on page 92).
3. Prepare the server for diagnosis (on page 92).
4. Use the Start diagnosis flowchart (on page 95) to begin the diagnostic process.

Important safety information

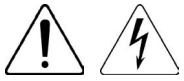
Familiarize yourself with the safety information in the following sections before troubleshooting the server.

Important safety information

Before servicing this product, read the *Important Safety Information* document provided with the server.

Symbols on equipment

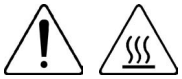
The following symbols may be placed on equipment to indicate the presence of potentially hazardous conditions.



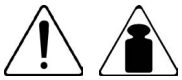
This symbol indicates the presence of hazardous energy circuits or electric shock hazards. Refer all servicing to qualified personnel.
WARNING: To reduce the risk of injury from electric shock hazards, do not open this enclosure. Refer all maintenance, upgrades, and servicing to qualified personnel.

This symbol indicates the presence of electric shock hazards. The area contains no user or field serviceable parts. Do not open for any reason.
WARNING: To reduce the risk of injury from electric shock hazards, do not open this enclosure.

This symbol on an RJ-45 receptacle indicates a network interface connection.
WARNING: To reduce the risk of electric shock, fire, or damage to the equipment, do not plug telephone or telecommunications connectors into this receptacle.



This symbol indicates the presence of a hot surface or hot component. If this surface is contacted, the potential for injury exists.
WARNING: To reduce the risk of injury from a hot component, allow the surface to cool before touching.



93 kg
205 lb

This symbol indicates that the component exceeds the recommended weight for one individual to handle safely.
WARNING: To reduce the risk of personal injury or damage to the equipment, observe local occupational health and safety requirements and guidelines for manual material handling.

These symbols, on power supplies or systems, indicate that the equipment is supplied by multiple sources of power.
WARNING: To reduce the risk of injury from electric shock, remove all power cords to completely disconnect power from the system.

Warnings and cautions

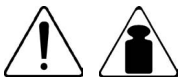
WARNING: Only authorized technicians trained by HP should attempt to repair this equipment. All troubleshooting and repair procedures are detailed to allow only subassembly/module-level repair. Because of the complexity of the individual boards and subassemblies, no one should attempt to make repairs at the component level or to make modifications to any printed wiring board. Improper repairs can create a safety hazard.

WARNING: To reduce the risk of personal injury or damage to the equipment, be sure that:

- The leveling feet are extended to the floor.
- The full weight of the rack rests on the leveling feet.
- The stabilizing feet are attached to the rack if it is a single-rack installation.
- The racks are coupled together in multiple-rack installations.
- Only one component is extended at a time. A rack may become unstable if more than one component is extended for any reason.

WARNING: To reduce the risk of electric shock or damage to the equipment:

- Do not disable the power cord grounding plug. The grounding plug is an important safety feature.
- Plug the power cord into a grounded (earthed) electrical outlet that is easily accessible at all times.
- Unplug the power cord from the power supply to disconnect power to the equipment.
- Do not route the power cord where it can be walked on or pinched by items placed against it. Pay particular attention to the plug, electrical outlet, and the point where the cord extends from the server.



93 kg
205 lb

WARNING: To reduce the risk of personal injury or damage to the equipment:

- Observe local occupation health and safety requirements and guidelines for manual handling.
- Obtain adequate assistance to lift and stabilize the chassis during installation or removal.
- The server is unstable when not fastened to the rails.
- When mounting the server in a rack, remove the power supplies and any other removable module to reduce the overall weight of the product.

CAUTION: To properly ventilate the system, you must provide at least 7.6 cm (3.0 in) of clearance at the front and back of the server.

CAUTION: The server is designed to be electrically grounded (earthed). To ensure proper operation, plug the AC power cord into a properly grounded AC outlet only.

Symptom information

Before troubleshooting a server problem, collect the following information:

- What events preceded the failure? After which steps does the problem occur?
- What has been changed since the time the server was working?
- Did you recently add or remove hardware or software? If so, did you remember to change the appropriate settings in the server setup utility, if necessary?
- How long has the server exhibited problem symptoms?
- If the problem occurs randomly, what is the duration or frequency?

To answer these questions, the following information may be useful:

- Run HP Insight Diagnostics (on page 85) and use the survey page to view the current configuration or to compare it to previous configurations.
- Refer to your hardware and software records for information.
- Refer to server LEDs and their statuses.

Prepare the server for diagnosis

1. Be sure the server is in the proper operating environment with adequate power, air conditioning, and humidity control. For required environmental conditions, see the server documentation.

2. Record any error messages displayed by the system.
3. Remove all diskettes, CD-ROMs, DVD-ROMs, and USB drive keys.
4. Power down the server and peripheral devices if you will be diagnosing the server offline. If possible, always perform an orderly shutdown:
   a. Exit any applications.
   b. Exit the operating system.
   c. Power down the server (on page 22).
5. Disconnect any peripheral devices not required for testing (any devices not necessary to power up the server). Do not disconnect the printer if you want to use it to print error messages.
6. Collect all tools and utilities, such as a Torx screwdriver, loopback adapters, ESD wrist strap, and software utilities, necessary to troubleshoot the problem.
   - You must have the appropriate Health Drivers and Management Agents installed on the server.

     To verify the server configuration, connect to the System Management homepage and select **Version Control Agent**. The VCA gives you a list of names and versions of all installed HP drivers, Management Agents, and utilities, and whether they are up-to-date.
   - HP recommends you have access to the server documentation for server-specific information.
   - HP recommends you have access to the SmartStart CD for value-added software and drivers required during the troubleshooting process. Download the current version of SmartStart from the HP website (http://www.hp.com/servers/smartstart).

Performing processor procedures in the troubleshooting process

Before performing any troubleshooting steps that involve processors, review the following guidelines:

- Be sure that only authorized personnel perform the troubleshooting steps that involve installing, removing, or replacing a processor.
- Always locate the documentation for your processor model before performing **any** steps that require installing, removing, or replacing a processor. If you cannot locate the hard copy of the instructions that shipped with the processor, see the processor instructions in this document.
- Some processor models require the use of a processor installation tool, and specific steps are documented to ensure that you do not damage the processor or processor socket on the system board. For server models that have pins inside the processor socket, remember that **THE PINS ON THE SYSTEM BOARD ARE VERY FRAGILE AND EASILY DAMAGED**. If you damage the socket, you must replace the system board.
- Depending on the server model, the contacts may be on the processor or they may be inside the processor socket. Never touch the contacts. **THE PINS ON THE SYSTEM BOARD ARE VERY FRAGILE AND EASILY DAMAGED**. If the contacts inside the processor socket are damaged, the system board must be replaced.
- Always complete all other troubleshooting procedures before removing or replacing a processor.

Breaking the server down to the minimum hardware configuration

During the troubleshooting process, you may be asked to break the server down to the minimum hardware configuration. A minimum configuration consists of only the components needed to boot the server and successfully pass POST.

When requested to break the server down to the minimum configuration, uninstall the following components, if installed:

- All additional DIMMs

  Leave only the minimum required to boot the server—either one DIMM or a pair of DIMMs. For more information, see the memory guidelines in the server user guide.
- All additional cooling fans, if applicable

  For the minimum fan configuration, see the server user guide.
- All additional power supplies, if applicable (leave one installed)
- All hard drives
- All optical drives (DVD-ROM, CD-ROM, and so forth)
- All optional mezzanine cards
- All expansion boards

Before removing the components, be sure to determine the minimum configuration for each component and follow all guidelines in the server user guide.

Always use the recommended minimum configuration above before removing any processors. If you are unable to isolate the issue with the configuration above, you will then remove all but one of the additional processors.

> △ **CAUTION:** Before removing or replacing any processors, be sure to follow the guidelines provided in "Performing processor procedures in the troubleshooting process (on page 93)." Failure to follow the recommended guidelines can cause damage to the system board, requiring replacement of the system board.

Loose connections

Action:

- Be sure all power cords are securely connected.
- Be sure all cables are properly aligned and securely connected for all external and internal components.
- Remove and check all data and power cables for damage. Be sure no cables have bent pins or damaged connectors.
- If a fixed cable tray is available for the server, be sure the cords and cables connected to the server are routed correctly through the tray.
- Be sure each device is properly seated. Avoid bending or flexing circuit boards when reseating components.
- If a device has latches, be sure they are completely closed and locked.
- Check any interlock or interconnect LEDs that may indicate a component is not connected properly.
- If problems continue to occur, remove and reinstall each device, checking the connectors and sockets for bent pins or other damage.

Service notifications

To view the latest service notifications, refer to the HP website (http://www.hp.com/go/bizsupport). Select the appropriate server model, and then click the **Troubleshoot a Problem** link on the product page.

Troubleshooting flowcharts

To effectively troubleshoot a problem, HP recommends that you start with the first flowchart in this section, "Start diagnosis flowchart (on page 95)," and follow the appropriate diagnostic path. If the other flowcharts do not provide a troubleshooting solution, follow the diagnostic steps in "General diagnosis flowchart (on page 96)." The General diagnosis flowchart is a generic troubleshooting process to be used when the problem is not server-specific or is not easily categorized into the other flowcharts.

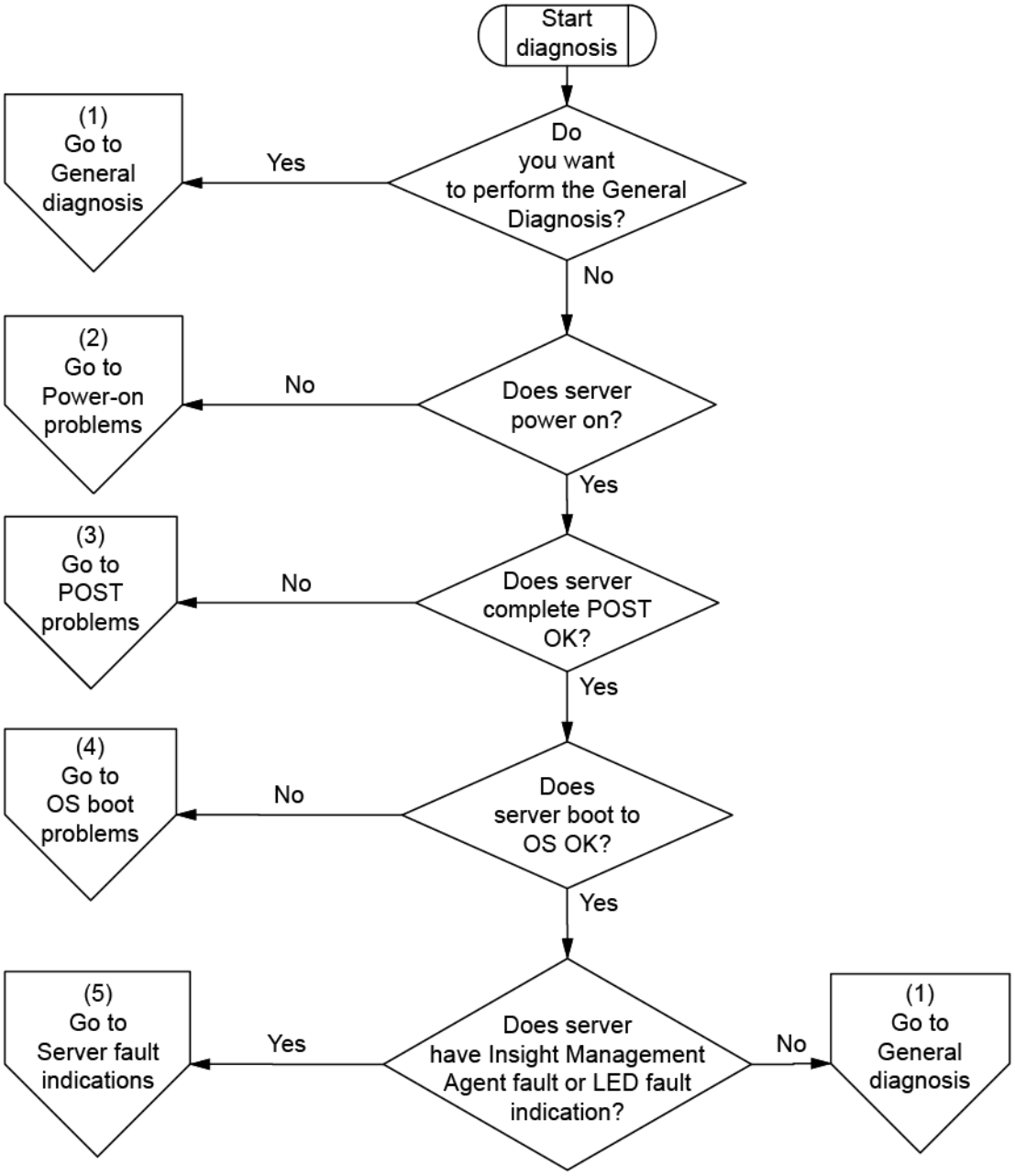
The available flowcharts include:

- Start diagnosis flowchart (on page 95)
- General diagnosis flowchart (on page 96)
- Server power-on problems flowchart (on page 98)
- POST problems flowchart (on page 101)
- OS boot problems flowchart (on page 103)
- Server fault indications flowchart (on page 104)

Start diagnosis flowchart

Use the following flowchart to start the diagnostic process.

Item	See
1	"General diagnosis flowchart (on page 96)"
2	"Power-on problems flowchart ("Server power-on problems flowchart" on page 98)"
3	"POST problems flowchart (on page 101)"
4	"OS boot problems flowchart (on page 103)"
5	"Server fault indications flowchart (on page 104)"

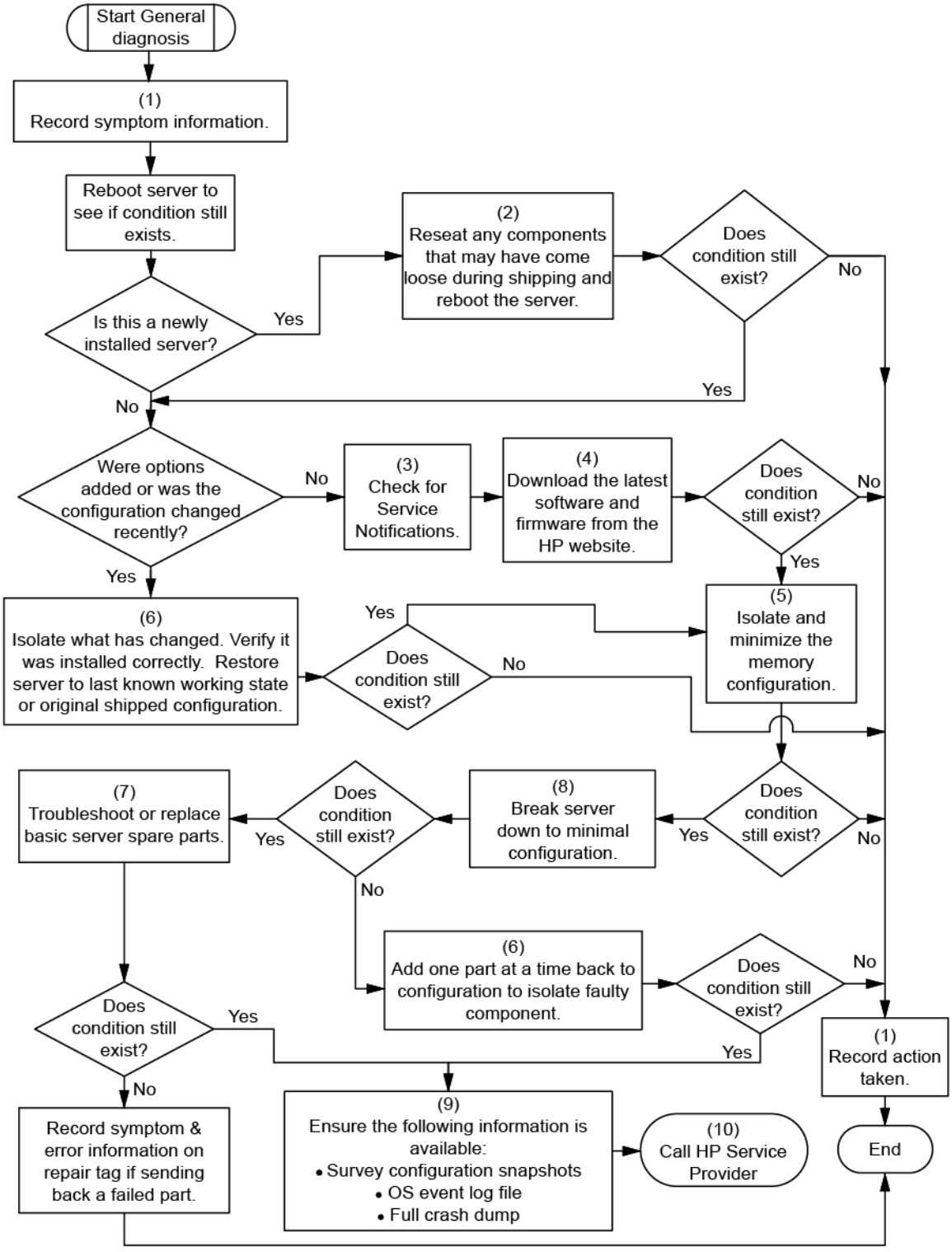


General diagnosis flowchart

The General diagnosis flowchart provides a generic approach to troubleshooting. If you are unsure of the problem, or if the other flowcharts do not fix the problem, use the following flowchart.

Item	See
1	"Symptom information (on page 92)"
2	"Loose connections (on page 94)"
3	"Service notifications (on page 95)"
4	The most recent version of a particular server or option firmware is available on the HP Support website (http://www.hp.com/support).

Item	See
5	"General memory problems are occurring" in the *HP ProLiant Servers Troubleshooting Guide* located on the Documentation CD or see "Troubleshooting resources (on page 90)"
6	Server maintenance and service guide, located on the Documentation CD or the HP website (http://www.hp.com/products/servers/platforms)
7	• "Hardware problems" in the *HP ProLiant Servers Troubleshooting Guide* located on the Documentation CD or see "Troubleshooting resources (on page 90)" • Server maintenance and service guide, located on the Documentation CD or the HP website (http://www.hp.com/products/servers/platforms)
8	"Breaking the server down to the minimum hardware configuration (on page 93)" or in the *HP ProLiant Servers Troubleshooting Guide* located on the Documentation CD or see "Troubleshooting resources (on page 90)"
9	• "Server information you need" in the *HP ProLiant Servers Troubleshooting Guide* located on the Documentation CD or see "Troubleshooting resources (on page 90)" • "Operating system information you need" in the *HP ProLiant Servers Troubleshooting Guide* located on the Documentation CD or see "Troubleshooting resources (on page 90)"
10	"HP contact information (on page 120)"


Start General diagnosis
(1) Record symptom information.
Reboot server to see if condition still exists.
Is this a newly installed server?
Yes
(2) Reseat any components that may have come loose during shipping and reboot the server.
Does condition still exist?
No
Yes
No
Were options added or was the configuration changed recently?
No
(3) Check for Service Notifications.
(4) Download the latest software and firmware from the HP website.
Does condition still exist?
No
Yes
Yes
(6) Isolate what has changed. Verify it was installed correctly. Restore server to last known working state or original shipped configuration.
Yes
Does condition still exist?
No
(5) Isolate and minimize the memory configuration.
(7) Troubleshoot or replace basic server spare parts.
Does condition still exist?
Yes
(8) Break server down to minimal configuration.
Does condition still exist?
Yes
No
No
(6) Add one part at a time back to configuration to isolate faulty component.
Does condition still exist?
No
Does condition still exist?
Yes
Yes
(1) Record action taken.
No
Record symptom & error information on repair tag if sending back a failed part.
(9) Ensure the following information is available:
• Survey configuration snapshots
• OS event log file
• Full crash dump
(10) Call HP Service Provider
End

Server power-on problems flowchart

Symptoms:

- The server does not power on.
- The system power LED is off or amber.

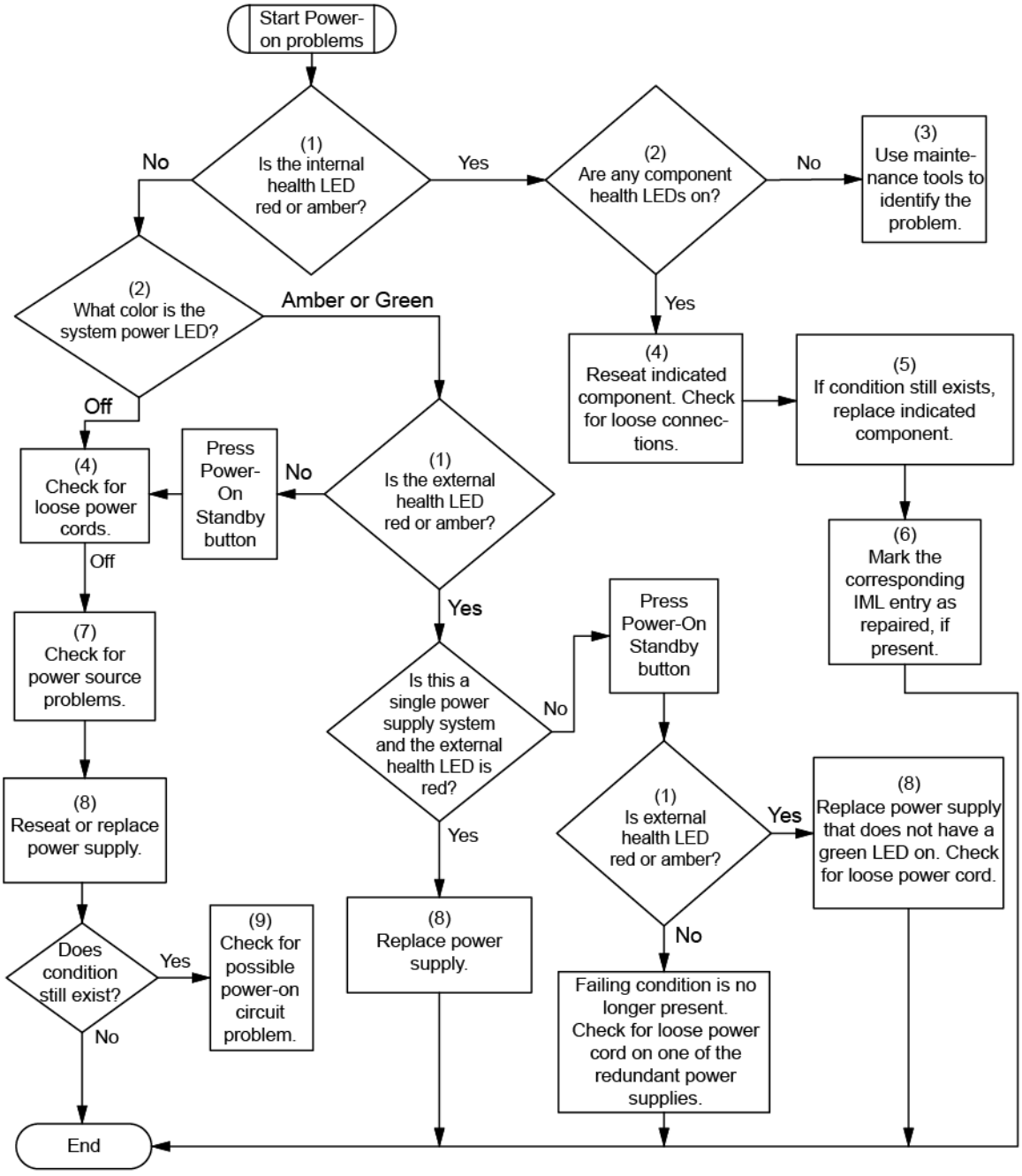
- The external health LED is red or amber.
- The internal health LED is red or amber.

NOTE: For the location of server LEDs and information on their statuses, refer to the server documentation.

Possible causes:

- Improperly seated or faulty power supply
- Loose or faulty power cord
- Power source problem
- Power on circuit problem
- Improperly seated component or interlock problem
- Faulty internal component

Item	See
1	"Server health LEDs" and "Component identification ("Server component identification" on page 7)"
2	"HP Insight Diagnostics (on page 85)" or in the *HP ProLiant Servers Troubleshooting Guide* located on the Documentation CD or see "Troubleshooting resources (on page 90)"
3	"Loose connections (on page 94)"
4	Server maintenance and service guide, located on the Documentation CD, or the HP website (http://www.hp.com/products/servers/platforms)
5	"Integrated Management Log" or in the *HP ProLiant Servers Troubleshooting Guide* located on the Documentation CD or see "Troubleshooting resources (on page 90)"
6	"Power source problems" in the *HP ProLiant Servers Troubleshooting Guide* located on the Documentation CD or see "Troubleshooting resources (on page 90)"
7	• "Power supply problems" in the *HP ProLiant Servers Troubleshooting Guide* located on the Documentation CD or see "Troubleshooting resources (on page 90)" • Server maintenance and service guide, located on the Documentation CD, or the HP website (http://www.hp.com/products/servers/platforms)
8	"System open circuits and short circuits" in the *HP ProLiant Servers Troubleshooting Guide* located on the Documentation CD or see "Troubleshooting resources (on page 90)"


Start Power-on problems
(1) Is the internal health LED red or amber?
No
Yes
(2) Are any component health LEDs on?
No
(3) Use maintenance tools to identify the problem.
Yes
(2) What color is the system power LED?
Amber or Green
Off
(4) Reseat indicated component. Check for loose connections.
(5) If condition still exists, replace indicated component.
(6) Mark the corresponding IML entry as repaired, if present.
(1) Is the external health LED red or amber?
No
Press Power-On Standby button
(4) Check for loose power cords.
Off
(7) Check for power source problems.
(8) Reseat or replace power supply.
Does condition still exist?
Yes
(9) Check for possible power-on circuit problem.
No
Yes
Is this a single power supply system and the external health LED is red?
No
Press Power-On Standby button
Yes
(8) Replace power supply.
(1) Is external health LED red or amber?
Yes
(8) Replace power supply that does not have a green LED on. Check for loose power cord.
No
Failing condition is no longer present. Check for loose power cord on one of the redundant power supplies.
End

POST problems flowchart

Symptoms:

- Server does not complete POST

  NOTE: The server has completed POST when the system attempts to access the boot device.

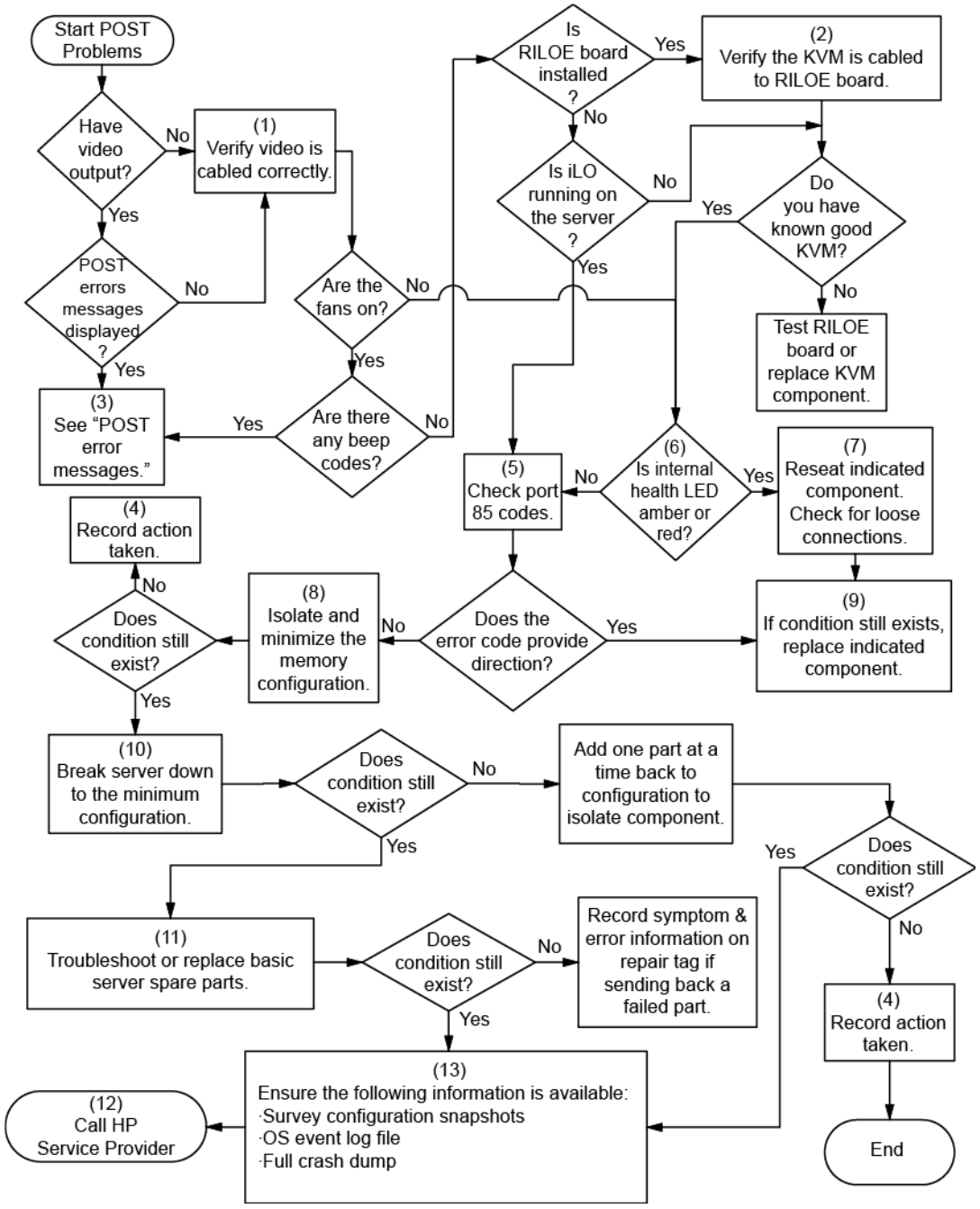
- Server completes POST with errors

Possible problems:

- Improperly seated or faulty internal component
- Faulty KVM device
- Faulty video device

Item	See
1	"Video problems" in the *HP ProLiant Servers Troubleshooting Guide* located on the Documentation CD or see "Troubleshooting resources (on page 90)"
2	KVM or iLO 3 documentation
3	"POST error messages and beep codes (on page 106, on page 107)"
4	"Symptom information (on page 92)"
5	"Port 85 and iLO messages" in the *HP ProLiant Servers Troubleshooting Guide* located on the Documentation CD or see "Troubleshooting resources (on page 90)"
6	"Server health LEDs" and "Component identification ("Server component identification" on page 7)"
7	"Loose connections (on page 94)"
8	"General memory problems are occurring" in the *HP ProLiant Servers Troubleshooting Guide* located on the Documentation CD or see "Troubleshooting resources (on page 90)"
9	Server maintenance and service guide, located on the Documentation CD or the HP website (http://www.hp.com/products/servers/platforms).
10	"Breaking the server down to the minimum hardware configuration (on page 93)" or in the *HP ProLiant Servers Troubleshooting Guide* located on the Documentation CD or see "Troubleshooting resources (on page 90)"
11	• "Hardware problems" in the *HP ProLiant Servers Troubleshooting Guide* located on the Documentation CD or see "Troubleshooting resources (on page 90)" • Server maintenance and service guide, located on the Documentation CD or the HP website (http://www.hp.com/products/servers/platforms)
12	"HP contact information (on page 120)"

Item	See
13	• "Server information you need" in the *HP ProLiant Servers Troubleshooting Guide* located on the Documentation CD or see "Troubleshooting resources (on page 90)" • "Operating system information you need" in the *HP ProLiant Servers Troubleshooting Guide* located on the Documentation CD or see "Troubleshooting resources (on page 90)"



OS boot problems flowchart

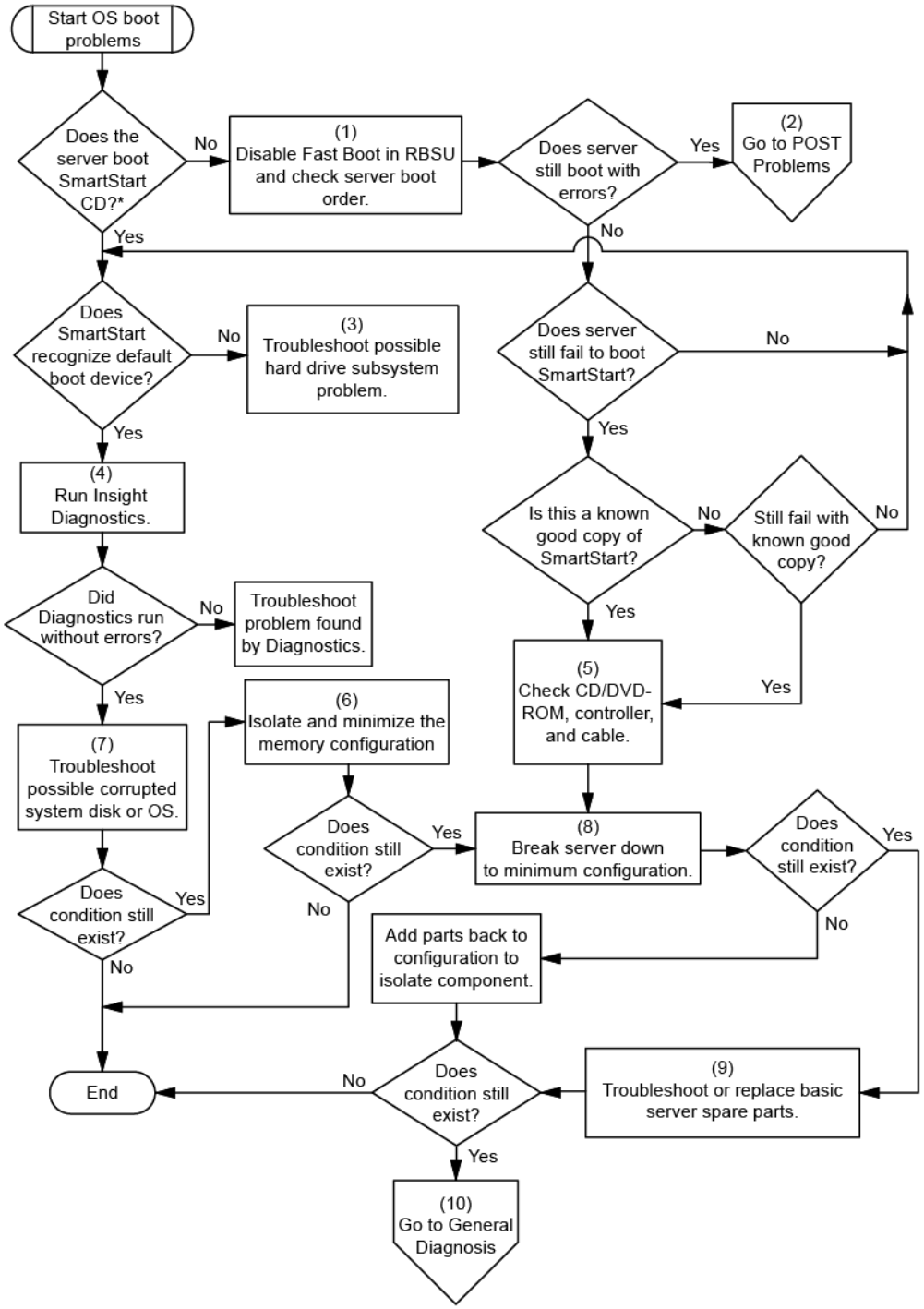
Symptoms:

- Server does not boot a previously installed operating system
- Server does not boot SmartStart

Possible causes:

- Corrupted operating system
- Hard drive subsystem problem
- Incorrect boot order setting in RBSU

Item	See
1	*HP ROM-Based Setup Utility User Guide* (*http://www.hp.com/servers/smartstart*)
2	"POST problems flowchart (on page 101)"
3	• "Hard drive problems" in the *HP ProLiant Servers Troubleshooting Guide* located on the Documentation CD or see "Troubleshooting resources (on page 90)" • Controller documentation
4	"HP Insight Diagnostics (on page 85)" or in the *HP ProLiant Servers Troubleshooting Guide* located on the Documentation CD or see "Troubleshooting resources (on page 90)"
5	• "CD-ROM and DVD drive problems" in the *HP ProLiant Servers Troubleshooting Guide* located on the Documentation CD or see "Troubleshooting resources (on page 90)" • Controller documentation • "Loose connections (on page 94)"
6	"General memory problems are occurring" in the *HP ProLiant Servers Troubleshooting Guide* located on the Documentation CD or see "Troubleshooting resources (on page 90)"
7	• "Operating system problems" in the *HP ProLiant Servers Troubleshooting Guide* located on the Documentation CD or see "Troubleshooting resources (on page 90)" • "HP contact information (on page 120)"
8	"Breaking the server down to the minimum hardware configuration (on page 93)" in the *HP ProLiant Servers Troubleshooting Guide* located on the Documentation CD or see "Troubleshooting resources (on page 90)"
9	• "Hardware problems" in the *HP ProLiant Servers Troubleshooting Guide* located on the Documentation CD or see "Troubleshooting resources (on page 90)" • Server maintenance and service guide, located on the Documentation CD or the HP website (http://www.hp.com/products/servers/platforms)
10	"General diagnosis flowchart (on page 96)"



Server fault indications flowchart

Symptoms:

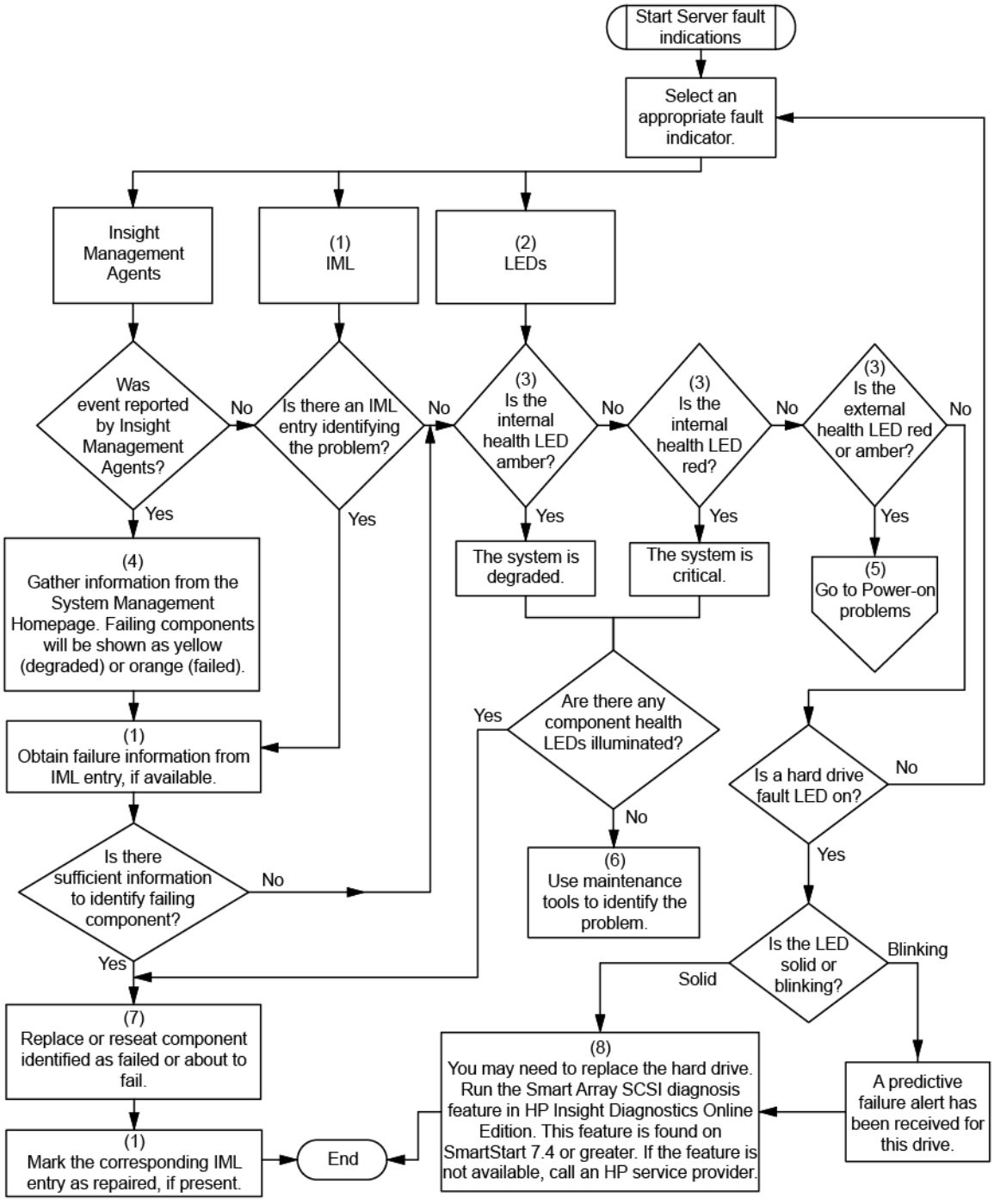
- Server boots, but a fault event is reported by Insight Management Agents (on page 84)
- Server boots, but the internal health LED, external health LED, or component health LED is red or amber

NOTE: For the location of server LEDs and information on their statuses, refer to the server documentation.

Possible causes:

- Improperly seated or faulty internal or external component
- Unsupported component installed
- Redundancy failure
- System overtemperature condition

Item	See
1	• "Integrated Management Log" or in the *HP ProLiant Servers Troubleshooting Guide* located on the Documentation CD or see "Troubleshooting resources (on page 90)" • "Event list error messages" in the *HP ProLiant Servers Troubleshooting Guide* located on the Documentation CD or see "Troubleshooting resources (on page 90)"
2	"Component identification ("Server component identification" on page 7)"
3	"Server health LEDs"
4	System Management Homepage (https://localhost:2381)
5	"Power-on problems flowchart ("Server power-on problems flowchart" on page 98)"
6	"HP Insight Diagnostics (on page 85)" or in the *HP ProLiant Servers Troubleshooting Guide* located on the Documentation CD or see "Troubleshooting resources (on page 90)"
7	• "Hardware problems" in the *HP ProLiant Servers Troubleshooting Guide* located on the Documentation CD or see "Troubleshooting resources (on page 90)" • Server maintenance and service guide, located on the Documentation CD or the HP website (http://www.hp.com/products/servers/platforms)
8	• "Smart Array SCSI Diagnosis feature" or in the *HP ProLiant Servers Troubleshooting Guide* located on the Documentation CD or see "Troubleshooting resources (on page 90)" • Server maintenance and service guide, located on the Documentation CD or the HP website (http://www.hp.com/products/servers/platforms) • "HP contact information (on page 120)"


Start Server fault indications
Select an appropriate fault indicator.
Insight Management Agents
(1) IML
(2) LEDs
Was event reported by Insight Management Agents?
No
Is there an IML entry identifying the problem?
No
(3) Is the internal health LED amber?
No
(3) Is the internal health LED red?
No
(3) Is the external health LED red or amber?
No
Yes
Yes
Yes
Yes
Yes
(4) Gather information from the System Management Homepage. Failing components will be shown as yellow (degraded) or orange (failed).
The system is degraded.
The system is critical.
(5) Go to Power-on problems
(1) Obtain failure information from IML entry, if available.
Yes
Are there any component health LEDs illuminated?
Is a hard drive fault LED on?
No
Is there sufficient information to identify failing component?
No
No
(6) Use maintenance tools to identify the problem.
Yes
Yes
Is the LED solid or blinking?
Blinking
Solid
(7) Replace or reseat component identified as failed or about to fail.
(8) You may need to replace the hard drive. Run the Smart Array SCSI diagnosis feature in HP Insight Diagnostics Online Edition. This feature is found on SmartStart 7.4 or greater. If the feature is not available, call an HP service provider.
A predictive failure alert has been received for this drive.
(1) Mark the corresponding IML entry as repaired, if present.
End

POST error messages and beep codes

Introduction to POST error messages

The error messages and codes in this section include all new messages generated by this server. Some messages are informational and do not indicate an error. A server generates only the codes that are applicable to its configuration and options.

For a complete listing of error messages, refer to the "POST error messages" in the *HP ProLiant Servers Troubleshooting Guide* located on the Documentation CD or on the HP website (http://www.hp.com/support).

⚠ **WARNING:** To avoid potential problems, ALWAYS read the warnings and cautionary information in the server documentation before removing, replacing, reseating, or modifying system components.

POST error messages and beep codes

For a complete listing of error messages, refer to the "POST error messages" in the *HP ProLiant Servers Troubleshooting Guide* located on the Documentation CD or on the HP website (http://www.hp.com/support).

⚠ **WARNING:** To avoid potential problems, ALWAYS read the warnings and cautionary information in the server documentation before removing, replacing, reseating, or modifying system components.

Regulatory compliance notices

Regulatory compliance identification numbers

For the purpose of regulatory compliance certifications and identification, this product has been assigned a unique regulatory model number. The regulatory model number can be found on the product nameplate label, along with all required approval markings and information. When requesting compliance information for this product, always refer to this regulatory model number. The regulatory model number is not the marketing name or model number of the product.

Federal Communications Commission notice

Part 15 of the Federal Communications Commission (FCC) Rules and Regulations has established Radio Frequency (RF) emission limits to provide an interference-free radio frequency spectrum. Many electronic devices, including computers, generate RF energy incidental to their intended function and are, therefore, covered by these rules. These rules place computers and related peripheral devices into two classes, A and B, depending upon their intended installation. Class A devices are those that may reasonably be expected to be installed in a business or commercial environment. Class B devices are those that may reasonably be expected to be installed in a residential environment (for example, personal computers). The FCC requires devices in both classes to bear a label indicating the interference potential of the device as well as additional operating instructions for the user.

FCC rating label

The FCC rating label on the device shows the classification (A or B) of the equipment. Class B devices have an FCC logo or ID on the label. Class A devices do not have an FCC logo or ID on the label. After you determine the class of the device, refer to the corresponding statement.

Class A equipment

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at personal expense.

Class B equipment

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to

radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit that is different from that to which the receiver is connected.
- Consult the dealer or an experienced radio or television technician for help.

Declaration of conformity for products marked with the FCC logo, United States only

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

For questions regarding this product, contact us by mail or telephone:

- Hewlett-Packard Company
  P. O. Box 692000, Mail Stop 530113
  Houston, Texas 77269-2000
- 1-800-HP-INVENT (1-800-474-6836). (For continuous quality improvement, calls may be recorded or monitored.)

For questions regarding this FCC declaration, contact us by mail or telephone:

- Hewlett-Packard Company
  P. O. Box 692000, Mail Stop 510101
  Houston, Texas 77269-2000
- 1-281-514-3333

To identify this product, refer to the part, series, or model number found on the product.

Modifications

The FCC requires the user to be notified that any changes or modifications made to this device that are not expressly approved by Hewlett-Packard Company may void the user's authority to operate the equipment.

Cables

Connections to this device must be made with shielded cables with metallic RFI/EMI connector hoods in order to maintain compliance with FCC Rules and Regulations.

Canadian notice (Avis Canadien)

Class A equipment

This Class A digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de la classe A respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

Class B equipment

This Class B digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de la classe B respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

European Union regulatory notice

Products bearing the CE marking comply with the following EU Directives:

- Low Voltage Directive 2006/95/EC
- EMC Directive 2004/108/EC
- Ecodesign Directive 2009/125/EC, where applicable

CE compliance of this product is valid if powered with the correct CE-marked AC adapter provided by HP.

If this product has wired and/or wireless telecommunications functionality, it also complies with the essential requirements of the following EU Directive:

- R&TTE Directive 1999/5/EC

Compliance with these directives implies conformity to the applicable harmonized European standards (European Norms) that are listed in the EU Declaration of Conformity issued by HP for this product or product family and available (in English only) either within the product documentation or at the following HP website (http://www.hp.eu/certificates) (type the product number in the search field).

The compliance is indicated by one of the following conformity markings placed on the product:

For non-telecommunications products and for EU harmonized telecommunications products, such as Bluetooth® within power class below 10mW.

For EU non-harmonized telecommunications products (If applicable, a 4-digit notified body number is inserted between CE and !).

Please refer to the regulatory label provided on the product.

The telecommunications functionality of this product may be used in the following EU and EFTA countries: Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Liechtenstein, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, and United Kingdom.

The telephone connector (not available for all products) is intended for connection to analogue telephone networks.

Products with wireless LAN devices:

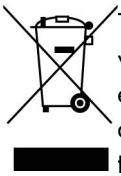
Some countries may have specific obligations or special requirements about the operation of Wireless LAN networks such as indoor use only or restrictions of the channels available. Please make sure that the country settings of the wireless network are correct.

France:

For 2.4 GHz Wireless LAN operation of this product, certain restrictions apply: This product may be used indoors for the entire 2400-MHz to 2483.5-MHz frequency band (channels 1 to 13). For outdoor use, only the 2400-MHz to 2454-MHz frequency band (channels 1 to 7) may be used. For the latest requirements, see the ARCEP website (http://www.arcep.fr) http://www.arcep.fr.

The point of contact for regulatory matters is Hewlett-Packard GmbH, Dept./MS: HQ-TRE, Herrenberger Strasse 140, 71034 Boeblingen, GERMANY.

Disposal of waste equipment by users in private households in the European Union



This symbol on the product or on its packaging indicates that this product must not be disposed of with your other household waste. Instead, it is your responsibility to dispose of your waste equipment by handing it over to a designated collection point for the recycling of waste electrical and electronic equipment. The separate collection and recycling of your waste equipment at the time of disposal will help to conserve natural resources and ensure that it is recycled in a manner that protects human health and the environment. For more information about where you can drop off your waste equipment for recycling, please contact your local city office, your household waste disposal service or the shop where you purchased the product.

Japanese notice

ご使用になっている装置にVCCIマークが付いていましたら、次の説明文をお読み下さい。

この装置は、クラスB情報技術装置です。この装置は、家庭環境で使用することを目的としていますが、この装置がラジオやテレビジョン受信機に近接して使用されると、受信障害を引き起こすことがあります。取扱説明書に従って正しい取り扱いをして下さい。

VCCI-B

VCCIマークが付いていない場合には、次の点にご注意下さい。

この装置は、クラスA情報技術装置です。この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者は適切な対策を講ずるよう要求されることがあります。

VCCI-A

BSMI notice

警告使用者:

這是甲類的資訊產品，在居住的環境中使用時，可能會造成射頻干擾，在這種情況下，使用者會被要求採取某些適當的對策。

Korean notice

Class A equipment

A급 기기 (업무용 방송통신기기)	이 기기는 업무용(A급)으로 전자파적합등록을 한 기기이오니 판매자 또는 사용자는 이 점을 주의하시기 바라며, 가정 외의 지역에서 사용하는 것을 목적으로 합니다.

Class B equipment

B급 기기 (가정용 방송통신기기)	이 기기는 가정용(B급)으로 전자파적합등록을 한 기기로서 주로 가정에서 사용하는 것을 목적으로 하며, 모든 지역에서 사용할 수 있습니다.

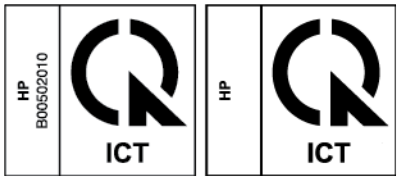
Chinese notice

Class A equipment

声明
此为 A 级产品，在生活环境中，该产品可能会造成无线电干扰。在这种情况下，可能需要用户对其干扰采取可行的措施。

Vietnam compliance marking notice

This marking is for applicable products only.



Ukraine notice

Україна
Додаток до документації користувача

Обладнання відповідає вимогам Технічного регламенту щодо обмеження використання деяких небезпечних речовин в електричному та електронному обладнанні, затвердженого постановою Кабінету Міністрів України від 3 грудня 2008 № 1057

Збережіть цей документ разом із документацією користувача для цього виробу

Laser compliance

This product may be provided with an optical storage device (that is, CD or DVD drive) and/or fiber optic transceiver. Each of these devices contains a laser that is classified as a Class 1 Laser Product in accordance with US FDA regulations and the IEC 60825-1. The product does not emit hazardous laser radiation.

Each laser product complies with 21 CFR 1040.10 and 1040.11 except for deviations pursuant to Laser Notice No. 50, dated June 24, 2007; and with IEC 60825-1:2007.

⚠ **WARNING:** Use of controls or adjustments or performance of procedures other than those specified herein or in the laser product's installation guide may result in hazardous radiation exposure. To reduce the risk of exposure to hazardous radiation:

- Do not try to open the module enclosure. There are no user-serviceable components inside.
- Do not operate controls, make adjustments, or perform procedures to the laser device other than those specified herein.
- Allow only HP Authorized Service technicians to repair the unit.

The Center for Devices and Radiological Health (CDRH) of the U.S. Food and Drug Administration implemented regulations for laser products on August 2, 1976. These regulations apply to laser products manufactured from August 1, 1976. Compliance is mandatory for products marketed in the United States.

Battery replacement notice

⚠ **WARNING:** The computer contains an internal lithium manganese dioxide, a vanadium pentoxide, or an alkaline battery pack. A risk of fire and burns exists if the battery pack is not properly handled. To reduce the risk of personal injury:

- Do not attempt to recharge the battery.
- Do not expose the battery to temperatures higher than 60°C (140°F).
- Do not disassemble, crush, puncture, short external contacts, or dispose of in fire or water.

Batteries, battery packs, and accumulators should not be disposed of together with the general household waste. To forward them to recycling or proper disposal, use the public collection system or return them to HP, an authorized HP Partner, or their agents.

For more information about battery replacement or proper disposal, contact an authorized reseller or an authorized service provider.

Taiwan battery recycling notice

The Taiwan EPA requires dry battery manufacturing or importing firms in accordance with Article 15 of the Waste Disposal Act to indicate the recovery marks on the batteries used in sales, giveaway or promotion. Contact a qualified Taiwanese recycler for proper battery disposal.

Power cord statement for Japan

製品には、同梱された電源コードをお使い下さい。
同梱された電源コードは、他の製品では使用出来ません。

Acoustics statement for Germany (Geräuschemission)

Schalldruckpegel L_{pA} < 70 dB(A)

Zuschauerpositionen (bystander positions), Normaler Betrieb (normal operation)

Nach ISO 7779:1999 (Typprüfung)

Wireless devices

You can install one or more integrated wireless devices. In some environments, the use of wireless devices might be restricted. Such restrictions might apply on airplanes, in hospitals, near explosives, or in other hazardous locations. Before you turn on this product, be sure that you understand local policies and have proper authorization.

Do not co-locate or operate this device in conjunction with any other antenna or transmitter.

To avoid the possibility of exceeding the FCC radio frequency exposure limits, human proximity to the antennae should be greater than 20 cm (8 in).

⚠ **WARNING:** **Exposure to Radio Frequency Radiation**—The radiated output power of this device is below the FCC radio frequency exposure limits. Nevertheless, human contact during normal operation should be minimized.

Brazilian notices

Este equipamento opera em caráter secundário, isto é, não tem direito a proteção contra interferência prejudicial, mesmo de estações do mesmo tipo, e não pode causar interferência a sistemas operando em caráter primário.

Canadian notices

Wireless operation is subject to two conditions. The first is that the wireless device may not cause interference. The second is that the wireless device must accept any interference, including interference that may cause undesired operation of the device.

Japanese notices

この機器の使用周波数帯では、電子レンジ等の産業・科学・医療用機器のほか工場の製造ライン等で使用されている移動体識別用の構内無線局（免許を要する無線局）及び特定小電力無線局（免許を要しない無線局）が運用されています。

1　この機器を使用する前に、近くで移動体識別用の構内無線局及び特定小電力無線局が運用されていないことを確認して下さい。

2　万一、この機器から移動体識別用の構内無線局に対して電波干渉の事例が発生した場合には、速やかに使用周波数を変更するか又は電波の発射を停止した上、下記連絡先にご連絡頂き、混信回避のための処置等（例えば、パーティションの設置など）についてご相談して下さい。

3　その他、この機器から移動体識別用の特定小電力無線局に対して電波干渉の事例が発生した場合など何かお困りのことが起きたときは、次の連絡先へお問い合わせ下さい。

連絡先：日本ヒューレット・パッカード株式会社　ＴＥＬ：０１２０－０１４１２１

Taiwan notices

低功率電波輻射性電機管理辦法

第十二條 經型式認證合格之低功率射頻電機，非經許可，公司、商號或使用者均不得擅自變更頻率、加大功率或變更原設計之特性及功能。

第十四條 低功率射頻電機之使用不得影響飛航安全及干擾合法通信；經發現有干擾現象時，應立即停用，並改善至無干擾時方得繼續使用。

前項合法通信，指依電信規定作業之無線電信。低功率射頻電機須忍受合法通信或工業、科學及醫療用電波輻射性電機設備之干擾。

Electrostatic discharge

Preventing electrostatic discharge

To prevent damaging the system, be aware of the precautions you need to follow when setting up the system or handling parts. A discharge of static electricity from a finger or other conductor may damage system boards or other static-sensitive devices. This type of damage may reduce the life expectancy of the device.

To prevent electrostatic damage:

- Avoid hand contact by transporting and storing products in static-safe containers.
- Keep electrostatic-sensitive parts in their containers until they arrive at static-free workstations.
- Place parts on a grounded surface before removing them from their containers.
- Avoid touching pins, leads, or circuitry.
- Always be properly grounded when touching a static-sensitive component or assembly.

Grounding methods to prevent electrostatic discharge

Several methods are used for grounding. Use one or more of the following methods when handling or installing electrostatic-sensitive parts:

- Use a wrist strap connected by a ground cord to a grounded workstation or computer chassis. Wrist straps are flexible straps with a minimum of 1 megohm ±10 percent resistance in the ground cords. To provide proper ground, wear the strap snug against the skin.
- Use heel straps, toe straps, or boot straps at standing workstations. Wear the straps on both feet when standing on conductive floors or dissipating floor mats.
- Use conductive field service tools.
- Use a portable field service kit with a folding static-dissipating work mat.

If you do not have any of the suggested equipment for proper grounding, have an authorized reseller install the part.

For more information on static electricity or assistance with product installation, contact an authorized reseller.

Specifications

Environmental Specifications

Specification	Value
System inlet temperature	—
Operating	10° to 35°C (50° to 95°F) at sea level with an altitude derating of 1.0°C per every 305 m (1.8°F per every 1000 ft) above sea level to a maximum of 3050 m (10,000 ft), no direct sustained sunlight. Maximum rate of change is 10°C/hr (18°F/hr). The upper limit may be limited by the type and number of options installed. System performance may be reduced if operating with a fan fault or above 30°C (86°F).
Non-operating	-30° to 60°C (-22° to 140°F). Maximum rate of change is 20°C/hr (36°F/hr).
Relative humidity (non-condensing)	—
Operating	10 to 90% relative humidity (Rh), 28°C (82.4°F) maximum wet bulb temperature, non-condensing.
Non-operating	5 to 95% relative humidity (Rh), 38.7°C (101.7°F) maximum wet bulb temperature, non-condensing.
Altitude	—
Operating	3050 m (10,000 ft). This value may be limited by the type and number of options installed. Maximum allowable altitude change rate is 457 m/min (1500 ft/min).
Non-operating	9144 m (30,000 ft). Maximum allowable altitude change rate is 457 m/min (1500 ft/min).
Acoustic noise	Listed are the declared A-Weighted sound power levels (LWAd) and declared average bystander position A-Weighted sound pressure levels (LpAm) when the product is operating in a 23°C ambient environment. Noise emissions were measured in accordance with ISO 7779 (ECMA 74) and declared in accordance with ISO 9296 (ECMA 109).

Specification	Value
Idle	L WAd 7.5 Bels L pAm 59.7 dB
Operating	L WAd 7.5 Bels L pAm 89.7 dB
Emissions Classification (EMC)	—
FCC rating	Class A
Normative Standards	CISPR 22; EN55022; EN55024; FCC CFR 47, Pt 15; ICES-003; CNS13438; GB9254; K22;K24; EN 61000-3-2; EN 61000-3-3; EN 60950-1; IEC 60950-1

Server Specifications

Specification	Value
Dimension	—
Height	35.36 cm (13.92 in)
Depth	87.63 cm (34.5 in)
Width	48.26 cm (19.0 in)
Weight (maximum)	93 kg (205 lb)
Weight (one hard drive, power supply and processor installed)	75 kg (165 lb)
Input requirement*	—
Rated line voltage	100-240 VAC
Rates input current	9.3A @ 100 VAC 9.5A @ 108-120 VAC 6.6A @ 200-240 VAC
Rated input frequency	50–60 Hz +/- 3hz
Input power (maximum)	4600 W
BTUs rating (maximum)	14,444 BTU/hr (worst case configuration and utilization)
Power supply output (per power supply)	—
Rated steady-state power	800 W @ 100 VAC 900 W @ 110-120 VAC 1200 W @ 200-240 VAC
Rated input power	950W @ 100 VAC 1075W @ 108–120 VAC 1375W @ 200-240 VAC
Maximum peak power	960 W @ 100 VAC 1080 W @ 110-120 VAC 1440 W @ 200-240 VAC

*To ensure the server has sufficient power during normal operation, a server configured with eight populated CPU sockets or a detected high power GPU requires high line (200 - 240 V) ac server configuration. As a precaution, if these configurations are detected on a low line (100 - 127 V) ac configured server the server will halt at Power-On Self-Test with a "Low line (100-120 VAC) power delivery is not sufficient for this

configuration. High line (200-240 VAC) delivery is required to operate the system in its current configuration" message and only boot to RBSU.

At POST, the server automatically detects whether the power supplies are connected to high-line power or low-line power. If the server is configured with eight populated CPU sockets or a detected high power GPU, the system will halt if it detects that the server is plugged into low-line power. This occurs by design because systems configured eight processors, and/ or high power graphics cards, with a large amount of memory, hard drives, or other options might require more power than can be provided by low-line power. POST halts this low-line configuration as a precaution against the server having insufficient power during operation.

If a you wish to operate a server in this configuration when utilizing low-line power, the power supply solution should be verified as sufficient using the HP Power Advisor (http://www.hp.com/go/hppoweradvisor). If the power solution is not deemed sufficient, the server may not have sufficient power to operate normally. If the solution is deemed sufficient, a ROM-Based Setup Utility option, outlined below, can be used to allow the system to operate in this configuration.

If the HP Power Advisor has determined that the server can be reliably powered at low-line power in this configuration, perform the following steps to override the Power Supply Requirements setting in ROM-Based Setup Utility (RBSU):

1. When the server halts, access RBSU.
2. Select "Advanced Options".
3. Scroll down to "Power Requirements Override" and choose to enable it.
4. Exit RBSU,which will reboot the server and should bypass the message on the subsequent boot.

Technical support

Before you contact HP

Be sure to have the following information available before you call HP:

- Technical support registration number (if applicable)
- Product serial number
- Product model name and number
- Product identification number
- Applicable error messages
- Add-on boards or hardware
- Third-party hardware or software
- Operating system type and revision level

HP contact information

For the name of the nearest HP authorized reseller:

- See the Contact HP worldwide (in English) webpage (http://welcome.hp.com/country/us/en/wwcontact.html).

For HP technical support:

- In the United States, for contact options see the Contact HP United States webpage (http://welcome.hp.com/country/us/en/contact_us.html). To contact HP by phone:
  - Call 1-800-HP-INVENT (1-800-474-6836). This service is available 24 hours a day, 7 days a week. For continuous quality improvement, calls may be recorded or monitored.
  - If you have purchased a Care Pack (service upgrade), call 1-800-633-3600. For more information about Care Packs, refer to the HP website (http://www.hp.com/hps).
- In other locations, see the Contact HP worldwide (in English) webpage (http://welcome.hp.com/country/us/en/wwcontact.html).

Customer Self Repair

HP products are designed with many Customer Self Repair (CSR) parts to minimize repair time and allow for greater flexibility in performing defective parts replacement. If during the diagnosis period HP (or HP service providers or service partners) identifies that the repair can be accomplished by the use of a CSR part, HP will ship that part directly to you for replacement. There are two categories of CSR parts:

- **Mandatory**—Parts for which customer self repair is mandatory. If you request HP to replace these parts, you will be charged for the travel and labor costs of this service.

- **Optional**—Parts for which customer self repair is optional. These parts are also designed for customer self repair. If, however, you require that HP replace them for you, there may or may not be additional charges, depending on the type of warranty service designated for your product.

NOTE: Some HP parts are not designed for customer self repair. In order to satisfy the customer warranty, HP requires that an authorized service provider replace the part. These parts are identified as "No" in the Illustrated Parts Catalog.

Based on availability and where geography permits, CSR parts will be shipped for next business day delivery. Same day or four-hour delivery may be offered at an additional charge where geography permits. If assistance is required, you can call the HP Technical Support Center and a technician will help you over the telephone. HP specifies in the materials shipped with a replacement CSR part whether a defective part must be returned to HP. In cases where it is required to return the defective part to HP, you must ship the defective part back to HP within a defined period of time, normally five (5) business days. The defective part must be returned with the associated documentation in the provided shipping material. Failure to return the defective part may result in HP billing you for the replacement. With a customer self repair, HP will pay all shipping and part return costs and determine the courier/carrier to be used.

For more information about HP's Customer Self Repair program, contact your local service provider. For the North American program, refer to the HP website (http://www.hp.com/go/selfrepair).

Réparation par le client (CSR)

Les produits HP comportent de nombreuses pièces CSR (Customer Self Repair = réparation par le client) afin de minimiser les délais de réparation et faciliter le remplacement des pièces défectueuses. Si pendant la période de diagnostic, HP (ou ses partenaires ou mainteneurs agréés) détermine que la réparation peut être effectuée à l'aide d'une pièce CSR, HP vous l'envoie directement. Il existe deux catégories de pièces CSR:

Obligatoire - Pièces pour lesquelles la réparation par le client est obligatoire. Si vous demandez à HP de remplacer ces pièces, les coûts de déplacement et main d'œuvre du service vous seront facturés.

Facultatif - Pièces pour lesquelles la réparation par le client est facultative. Ces pièces sont également conçues pour permettre au client d'effectuer lui-même la réparation. Toutefois, si vous demandez à HP de remplacer ces pièces, l'intervention peut ou non vous être facturée, selon le type de garantie applicable à votre produit.

REMARQUE: Certaines pièces HP ne sont pas conçues pour permettre au client d'effectuer lui-même la réparation. Pour que la garantie puisse s'appliquer, HP exige que le remplacement de la pièce soit effectué par un Mainteneur Agréé. Ces pièces sont identifiées par la mention "Non" dans le Catalogue illustré.

Les pièces CSR sont livrées le jour ouvré suivant, dans la limite des stocks disponibles et selon votre situation géographique. Si votre situation géographique le permet et que vous demandez une livraison le jour même ou dans les 4 heures, celle-ci vous sera facturée. Pour bénéficier d'une assistance téléphonique, appelez le Centre d'assistance technique HP. Dans les documents envoyés avec la pièce de rechange CSR, HP précise s'il est nécessaire de lui retourner la pièce défectueuse. Si c'est le cas, vous devez le faire dans le délai indiqué, généralement cinq (5) jours ouvrés. La pièce et sa documentation doivent être retournées dans l'emballage fourni. Si vous ne retournez pas la pièce défectueuse, HP se réserve le droit de vous facturer les coûts de remplacement. Dans le cas d'une pièce CSR, HP supporte l'ensemble des frais d'expédition et de retour, et détermine la société de courses ou le transporteur à utiliser.

Pour plus d'informations sur le programme CSR de HP, contactez votre Mainteneur Agrée local. Pour plus d'informations sur ce programme en Amérique du Nord, consultez le site Web HP (http://www.hp.com/go/selfrepair).

Riparazione da parte del cliente

Per abbreviare i tempi di riparazione e garantire una maggiore flessibilità nella sostituzione di parti difettose, i prodotti HP sono realizzati con numerosi componenti che possono essere riparati direttamente dal cliente (CSR, Customer Self Repair). Se in fase di diagnostica HP (o un centro di servizi o di assistenza HP) identifica il guasto come riparabile mediante un ricambio CSR, HP lo spedirà direttamente al cliente per la sostituzione. Vi sono due categorie di parti CSR:

Obbligatorie – Parti che devono essere necessariamente riparate dal cliente. Se il cliente ne affida la riparazione ad HP, deve sostenere le spese di spedizione e di manodopera per il servizio.

Opzionali – Parti la cui riparazione da parte del cliente è facoltativa. Si tratta comunque di componenti progettati per questo scopo. Se tuttavia il cliente ne richiede la sostituzione ad HP, potrebbe dover sostenere spese addizionali a seconda del tipo di garanzia previsto per il prodotto.

NOTA: alcuni componenti HP non sono progettati per la riparazione da parte del cliente. Per rispettare la garanzia, HP richiede che queste parti siano sostituite da un centro di assistenza autorizzato. Tali parti sono identificate da un "No" nel Catalogo illustrato dei componenti.

In base alla disponibilità e alla località geografica, le parti CSR vengono spedite con consegna entro il giorno lavorativo seguente. La consegna nel giorno stesso o entro quattro ore è offerta con un supplemento di costo solo in alcune zone. In caso di necessità si può richiedere l'assistenza telefonica di un addetto del centro di supporto tecnico HP. Nel materiale fornito con una parte di ricambio CSR, HP specifica se il cliente deve restituire dei componenti. Qualora sia richiesta la resa ad HP del componente difettoso, lo si deve spedire ad HP entro un determinato periodo di tempo, generalmente cinque (5) giorni lavorativi. Il componente difettoso deve essere restituito con la documentazione associata nell'imballo di spedizione fornito. La mancata restituzione del componente può comportare la fatturazione del ricambio da parte di HP. Nel caso di riparazione da parte del cliente, HP sostiene tutte le spese di spedizione e resa e sceglie il corriere/vettore da utilizzare.

Per ulteriori informazioni sul programma CSR di HP contattare il centro di assistenza di zona. Per il programma in Nord America fare riferimento al sito Web HP (http://www.hp.com/go/selfrepair).

Customer Self Repair

HP Produkte enthalten viele CSR-Teile (Customer Self Repair), um Reparaturzeiten zu minimieren und höhere Flexibilität beim Austausch defekter Bauteile zu ermöglichen. Wenn HP (oder ein HP Servicepartner) bei der Diagnose feststellt, dass das Produkt mithilfe eines CSR-Teils repariert werden kann, sendet Ihnen HP dieses Bauteil zum Austausch direkt zu. CSR-Teile werden in zwei Kategorien unterteilt:

Zwingend – Teile, für die das Customer Self Repair-Verfahren zwingend vorgegeben ist. Wenn Sie den Austausch dieser Teile von HP vornehmen lassen, werden Ihnen die Anfahrt- und Arbeitskosten für diesen Service berechnet.

Optional – Teile, für die das Customer Self Repair-Verfahren optional ist. Diese Teile sind auch für Customer Self Repair ausgelegt. Wenn Sie jedoch den Austausch dieser Teile von HP vornehmen lassen möchten, können bei diesem Service je nach den für Ihr Produkt vorgesehenen Garantiebedingungen zusätzliche Kosten anfallen.

HINWEIS: Einige Teile sind nicht für Customer Self Repair ausgelegt. Um den Garantieanspruch des Kunden zu erfüllen, muss das Teil von einem HP Servicepartner ersetzt werden. Im illustrierten Teilekatalog sind diese Teile mit „No“ bzw. „Nein“ gekennzeichnet.

CSR-Teile werden abhängig von der Verfügbarkeit und vom Lieferziel am folgenden Geschäftstag geliefert. Für bestimmte Standorte ist eine Lieferung am selben Tag oder innerhalb von vier Stunden gegen einen Aufpreis verfügbar. Wenn Sie Hilfe benötigen, können Sie das HP technische Support Center anrufen und sich von einem Mitarbeiter per Telefon helfen lassen. Den Materialien, die mit einem CSR-Ersatzteil geliefert werden, können Sie entnehmen, ob das defekte Teil an HP zurückgeschickt werden muss. Wenn es erforderlich ist, das defekte Teil an HP zurückzuschicken, müssen Sie dies innerhalb eines vorgegebenen Zeitraums tun, in der Regel innerhalb von fünf (5) Geschäftstagen. Das defekte Teil muss mit der zugehörigen Dokumentation in der Verpackung zurückgeschickt werden, die im Lieferumfang enthalten ist. Wenn Sie das defekte Teil nicht zurückschicken, kann HP Ihnen das Ersatzteil in Rechnung stellen. Im Falle von Customer Self Repair kommt HP für alle Kosten für die Lieferung und Rücksendung auf und bestimmt den Kurier-/Frachtdienst.

Weitere Informationen über das HP Customer Self Repair Programm erhalten Sie von Ihrem Servicepartner vor Ort. Informationen über das CSR-Programm in Nordamerika finden Sie auf der HP Website unter (http://www.hp.com/go/selfrepair).

Reparaciones del propio cliente

Los productos de HP incluyen muchos componentes que el propio usuario puede reemplazar (*Customer Self Repair*, CSR) para minimizar el tiempo de reparación y ofrecer una mayor flexibilidad a la hora de realizar sustituciones de componentes defectuosos. Si, durante la fase de diagnóstico, HP (o los proveedores o socios de servicio de HP) identifica que una reparación puede llevarse a cabo mediante el uso de un componente CSR, HP le enviará dicho componente directamente para que realice su sustitución. Los componentes CSR se clasifican en dos categorías:

- **Obligatorio:** componentes para los que la reparación por parte del usuario es obligatoria. Si solicita a HP que realice la sustitución de estos componentes, tendrá que hacerse cargo de los gastos de desplazamiento y de mano de obra de dicho servicio.
- **Opcional:** componentes para los que la reparación por parte del usuario es opcional. Estos componentes también están diseñados para que puedan ser reparados por el usuario. Sin embargo, si precisa que HP realice su sustitución, puede o no conllevar costes adicionales, dependiendo del tipo de servicio de garantía correspondiente al producto.

NOTA: Algunos componentes no están diseñados para que puedan ser reparados por el usuario. Para que el usuario haga valer su garantía, HP pone como condición que un proveedor de servicios autorizado realice la sustitución de estos componentes. Dichos componentes se identifican con la palabra "No" en el catálogo ilustrado de componentes.

Según la disponibilidad y la situación geográfica, los componentes CSR se enviarán para que lleguen a su destino al siguiente día laborable. Si la situación geográfica lo permite, se puede solicitar la entrega en el mismo día o en cuatro horas con un coste adicional. Si precisa asistencia técnica, puede llamar al Centro de asistencia técnica de HP y recibirá ayuda telefónica por parte de un técnico. Con el envío de materiales para la sustitución de componentes CSR, HP especificará si los componentes defectuosos deberán devolverse a HP. En aquellos casos en los que sea necesario devolver algún componente a HP, deberá hacerlo en el periodo de tiempo especificado, normalmente cinco días laborables. Los componentes defectuosos deberán devolverse con toda la documentación relacionada y con el embalaje de envío. Si no enviara el componente defectuoso requerido, HP podrá cobrarle por el de sustitución. En el caso de todas sustituciones que lleve a cabo el cliente, HP se hará cargo de todos los gastos de envío y devolución de componentes y escogerá la empresa de transporte que se utilice para dicho servicio.

Para obtener más información acerca del programa de Reparaciones del propio cliente de HP, póngase en contacto con su proveedor de servicios local. Si está interesado en el programa para Norteamérica, visite la página web de HP siguiente (http://www.hp.com/go/selfrepair).

Customer Self Repair

Veel onderdelen in HP producten zijn door de klant zelf te repareren, waardoor de reparatieduur tot een minimum beperkt kan blijven en de flexibiliteit in het vervangen van defecte onderdelen groter is. Deze onderdelen worden CSR-onderdelen (Customer Self Repair) genoemd. Als HP (of een HP Service Partner) bij de diagnose vaststelt dat de reparatie kan worden uitgevoerd met een CSR-onderdeel, verzendt HP dat onderdeel rechtstreeks naar u, zodat u het defecte onderdeel daarmee kunt vervangen. Er zijn twee categorieën CSR-onderdelen:

Verplicht: Onderdelen waarvoor reparatie door de klant verplicht is. Als u HP verzoekt deze onderdelen voor u te vervangen, worden u voor deze service reiskosten en arbeidsloon in rekening gebracht.

Optioneel: Onderdelen waarvoor reparatie door de klant optioneel is. Ook deze onderdelen zijn ontworpen voor reparatie door de klant. Als u echter HP verzoekt deze onderdelen voor u te vervangen, kunnen daarvoor extra kosten in rekening worden gebracht, afhankelijk van het type garantieservice voor het product.

OPMERKING: Sommige HP onderdelen zijn niet ontwikkeld voor reparatie door de klant. In verband met de garantievoorwaarden moet het onderdeel door een geautoriseerde Service Partner worden vervangen. Deze onderdelen worden in de geïllustreerde onderdelencatalogus aangemerkt met "Nee".

Afhankelijk van de leverbaarheid en de locatie worden CSR-onderdelen verzonden voor levering op de eerstvolgende werkdag. Levering op dezelfde dag of binnen vier uur kan tegen meerkosten worden aangeboden, indien dit mogelijk is gezien de locatie. Indien assistentie gewenst is, belt u een HP Service Partner om via de telefoon technische ondersteuning te ontvangen. HP vermeldt in de documentatie bij het vervangende CSR-onderdeel of het defecte onderdeel aan HP moet worden geretourneerd. Als het defecte onderdeel aan HP moet worden teruggezonden, moet u het defecte onderdeel binnen een bepaalde periode, gewoonlijk vijf (5) werkdagen, retourneren aan HP. Het defecte onderdeel moet met de bijbehorende documentatie worden geretourneerd in het meegeleverde verpakkingsmateriaal. Als u het defecte onderdeel niet terugzendt, kan HP u voor het vervangende onderdeel kosten in rekening brengen. Bij reparatie door de klant betaalt HP alle verzendkosten voor het vervangende en geretourneerde onderdeel en kiest HP zelf welke koerier/transportonderneming hiervoor wordt gebruikt.

Neem contact op met een Service Partner voor meer informatie over het Customer Self Repair programma van HP. Informatie over Service Partners vindt u op de HP website (http://www.hp.com/go/selfrepair).

Reparo feito pelo cliente

Os produtos da HP são projetados com muitas peças para reparo feito pelo cliente (CSR) de modo a minimizar o tempo de reparo e permitir maior flexibilidade na substituição de peças com defeito. Se, durante o período de diagnóstico, a HP (ou fornecedores/parceiros de serviço da HP) concluir que o reparo pode ser efetuado pelo uso de uma peça CSR, a peça de reposição será enviada diretamente ao cliente. Existem duas categorias de peças CSR:

Obrigatória – Peças cujo reparo feito pelo cliente é obrigatório. Se desejar que a HP substitua essas peças, serão cobradas as despesas de transporte e mão-de-obra do serviço.

Opcional – Peças cujo reparo feito pelo cliente é opcional. Essas peças também são projetadas para o reparo feito pelo cliente. No entanto, se desejar que a HP as substitua, pode haver ou não a cobrança de taxa adicional, dependendo do tipo de serviço de garantia destinado ao produto.

OBSERVAÇÃO: Algumas peças da HP não são projetadas para o reparo feito pelo cliente. A fim de cumprir a garantia do cliente, a HP exige que um técnico autorizado substitua a peça. Essas peças estão identificadas com a marca "No" (Não), no catálogo de peças ilustrado.

Conforme a disponibilidade e o local geográfico, as peças CSR serão enviadas no primeiro dia útil após o pedido. Onde as condições geográficas permitirem, a entrega no mesmo dia ou em quatro horas pode ser feita mediante uma taxa adicional. Se precisar de auxílio, entre em contato com o Centro de suporte técnico da HP para que um técnico o ajude por telefone. A HP especifica nos materiais fornecidos com a peça CSR de reposição se a peça com defeito deve ser devolvida à HP. Nos casos em que isso for necessário, é preciso enviar a peça com defeito à HP dentro do período determinado, normalmente cinco (5) dias úteis. A peça com defeito deve ser enviada com a documentação correspondente no material de transporte fornecido. Caso não o faça, a HP poderá cobrar a reposição. Para as peças de reparo feito pelo cliente, a HP paga todas as despesas de transporte e de devolução da peça e determina a transportadora/serviço postal a ser utilizado.

Para obter mais informações sobre o programa de reparo feito pelo cliente da HP, entre em contato com o fornecedor de serviços local. Para o programa norte-americano, visite o site da HP (http://www.hp.com/go/selfrepair).

顧客自己修理保証サービス

修理時間を短縮し、故障部品の交換における高い柔軟性を確保するために、HP製品には多数の顧客自己修理（CSR）部品があります。診断の際に、CSR部品を使用すれば修理ができるとHP（HPまたはHP正規保守代理店）が判断した場合、HPはその部品を直接、お客様に発送し、お客様に交換していただきます。CSR部品には以下の2通りがあります。

- 必須 - 顧客自己修理が必須の部品。当該部品について、もしもお客様がHPに交換作業を依頼される場合には、その修理サービスに関する交通費および人件費がお客様に請求されます。
- 任意 - 顧客自己修理が任意である部品。この部品も顧客自己修理用です。当該部品について、もしもお客様がHPに交換作業を依頼される場合には、お買い上げの製品に適用される保証サービス内容の範囲内においては、別途費用を負担していただくことなく保証サービスを受けることができます。

注： HP製品の一部の部品は、顧客自己修理用ではありません。製品の保証を継続するためには、HPまたはHP正規保守代理店による交換作業が必須となります。部品カタログには、当該部品が顧客自己修理除外品である旨が記載されています。

部品供給が可能な場合、地域によっては、CSR部品を翌営業日に届くように発送します。また、地域によっては、追加費用を負担いただくことにより同日または4時間以内に届くように発送することも可能な場合があります。サポートが必要なときは、HPの修理受付窓口に電話していただければ、技術者が電話でアドバイスします。交換用のCSR部品または同梱物には、故障部品をHPに返送する必要があるかどうかが表示されています。故障部品をHPに返送する必要がある場合は、指定期限内（通常は5営業日以内）に故障部品をHPに返送してください。故障部品を返送する場合は、届いた時の梱包箱に関連書類とともに入れてください。故障部品を返送しない場合、HPから部品費用が請求されます。顧客自己修理の際には、HPは送料および部品返送費を全額負担し、使用する宅配便会社や運送会社を指定します。

客户自行维修

HP 产品提供许多客户自行维修 (CSR) 部件，以尽可能缩短维修时间和在更换缺陷部件方面提供更大的灵活性。如果在诊断期间 HP（或 HP 服务提供商或服务合作伙伴）确定可以通过使用 CSR 部件完成维修，HP 将直接把该部件发送给您进行更换。有两类 CSR 部件：

- **强制性的** — 要求客户必须自行维修的部件。如果您请求 HP 更换这些部件，则必须为该服务支付差旅费和人工费用。
- **可选的** — 客户可以选择是否自行维修的部件。这些部件也是为客户自行维修设计的。不过，如果您要求 HP 为您更换这些部件，则根据为您的产品指定的保修服务类型，HP 可能收取或不再收取任何附加费用。

注：某些 HP 部件的设计并未考虑客户自行维修。为了满足客户保修的需要，HP 要求授权服务提供商更换相关部件。这些部件在部件图解目录中标记为“否”。

CSR 部件将在下一个工作日发运（取决于备货情况和允许的地理范围）。在允许的地理范围内，可在当天或四小时内发运，但要收取额外费用。如果需要帮助，您可以致电 HP 技术支持中心，将会有技术人员通过电话为您提供帮助。HP 会在随更换的 CSR 部件发运的材料中指明是否必须将有缺陷的部件返还给 HP。如果要求您将有缺陷的部件返还给 HP，那么您必须在规定期限内（通常是五 (5) 个工作日）将缺陷部件发给 HP。有缺陷的部件必须随所提供的发运材料中的相关文件一起返还。如果未能送还有缺陷的部件，HP 可能会要求您支付更换费用。客户自行维修时，HP 将承担所有相关运输和部件返回费用，并指定快递商/承运商。

有关 HP 客户自行维修计划的详细信息，请与您当地的服务提供商联系。有关北美地区的计划，请访问 HP 网站 (http://www.hp.com/go/selfrepair)。

客戶自行維修

HP 產品設計了許多「客戶自行維修」(CSR) 的零件以減少維修時間，並且使得更換瑕疵零件時能有更大的彈性。如果在診斷期間 HP（或 HP 服務供應商或維修夥伴）辨認出此項維修工作可以藉由使用 CSR 零件來完成，則 HP 將直接寄送該零件給您作更換。CSR 零件分為兩種類別：

- **強制的** — 客戶自行維修所使用的零件是強制性的。如果您要求 HP 更換這些零件，HP 將會向您收取此服務所需的外出費用與勞動成本。
- **選購的** — 客戶自行維修所使用的零件是選購的。這些零件也設計用於客戶自行維修之用。不過，如果您要求 HP 為您更換，則可能需要也可能不需要負擔額外的費用，端視針對此產品指定的保固服務類型而定。

備註：某些 HP 零件沒有消費者可自行維修的設計。為符合客戶保固，HP 需要授權的服務供應商更換零件。這些零件在圖示的零件目錄中，被標示為「否」。

基於材料取得及環境允許的情況下，CSR 零件將於下一個工作日以快遞寄送。在環境的允許下當天或四小時內送達，則可能需要額外的費用。若您需要協助，可致電「HP 技術支援中心」，會有一位技術人員透過電話來協助您。不論損壞的零件是否必須退回，HP 皆會在與 CSR 替換零件一起運送的材料中註明。若要將損壞的零件退回 HP，您必須在指定的一段時間內（通常為五 (5) 個工作天），將損壞的零件寄回 HP。損壞的零件必須與寄送資料中隨附的相關技術文件一併退還。如果無法退還損壞的零件，HP 可能要向您收取替換費用。針對客戶自行維修情形，HP 將負責所有運費及零件退還費用並指定使用何家快遞/貨運公司。

如需 HP 的「客戶自行維修」方案詳細資訊，請連絡您當地的服務供應商。至於北美方案，請參閱 HP 網站 (http://www.hp.com/go/selfrepair)。

고객 셀프 수리

HP 제품은 수리 시간을 최소화하고 결함이 있는 부품 교체 시 더욱 융통성을 발휘할 수 있도록 하기 위해 고객 셀프 수리(CSR) 부품을 다량 사용하여 설계되었습니다. 진단 기간 동안 HP(또는 HP 서비스 공급업체 또는 서비스 협력업체)에서 CSR 부품을 사용하여 수리가 가능하다고 판단되면 HP는 해당 부품을 바로 사용자에게 보내어 사용자가 교체할 수 있도록 합니다. CSR 부품에는 두 가지 종류가 있습니다.

- **고객 셀프 수리가 의무 사항인 필수 부품.** 사용자가 HP에 이 부품의 교체를 요청할 경우 이 서비스에 대한 출장비 및 작업비가 청구됩니다.
- **고객 셀프 수리가 선택 사항인 부품.** 이 부품들도 고객 셀프 수리가 가능하도록 설계되었습니다. 하지만 사용자가 HP에 이 부품의 교체를 요청할 경우 사용자가 구입한 제품에 해당하는 보증 서비스 유형에 따라 추가 비용 없이 교체가 가능할 수 있습니다.

참고: 일부 HP 부품은 고객 셀프 수리가 불가능하도록 설계되었습니다. HP는 만족스러운 고객 보증을 위해 공인 서비스 제공업체를 통해 부품을 교체하도록 하고 있습니다. 이러한 부품들은 Illustrated Parts Catalog에 "No"라고 표시되어 있습니다.

CSR 부품은 재고 상태와 지리적 조건이 허용하는 경우 다음 영업일 납품이 가능하도록 배송이 이루어집니다. 지리적 조건이 허용하는 경우 추가 비용이 청구되는 조건으로 당일 또는 4시간 배송이 가능할 수도 있습니다. 도움이 필요하시면 HP 기술 지원 센터로 전화하십시오. 전문 기술자가 전화로 도움을 줄 것입니다. HP는 결함이 발생한 부품을 HP로 반환해야 하는지 여부를 CSR 교체 부품과 함께 배송된 자료에 지정합니다. 결함이 발생한 부품을 HP로 반환해야 하는 경우에는 지정된 기간 내(통상 영업일 기준 5일)에 HP로 반환해야 합니다. 이 때 결함이 발생한 부품은 제공된 포장 재료에 넣어 관련 설명서와 함께 반환해야 합니다. 결함이 발생한 부품을 반환하지 않는 경우 HP가 교체 부품에 대해 비용을 청구할 수 있습니다. 고객 셀프 수리의 경우, HP는 모든 운송 및 부품 반환 비용을 부담하며 이용할 운송업체 및 택배 서비스를 결정합니다.

HP 고객 셀프 수리 프로그램에 대한 자세한 내용은 가까운 서비스 제공업체에 문의하십시오. 북미 지역의 프로그램에 대해서는 HP 웹 사이트(http://www.hp.com/go/selfrepair)를 참조하십시오.

Acronyms and abbreviations

ABEND

abnormal end

ACU

Array Configuration Utility

ADU

Array Diagnostics Utility

AMP

Advanced Memory Protection

ASR

Automatic Server Recovery

BBWC

battery-backed write cache

CSA

Canadian Standards Association

ESD

electrostatic discharge

FBWC

flash-backed write cache

GPU

graphics processing unit

IEC

International Electrotechnical Commission

iLO 3

Integrated Lights-Out 3

IML

Integrated Management Log

KVM

keyboard, video, and mouse

NIC

network interface controller

NVRAM

non-volatile memory

ORCA

Option ROM Configuration for Arrays

PCIe

peripheral component interconnect express

PCI-X

peripheral component interconnect extended

PDU

power distribution unit

PID

port ID

POST

Power-On Self Test

PSP

ProLiant Support Pack

RBSU

ROM-Based Setup Utility

RDP

Rapid Deployment Pack

SAS

serial attached SCSI

SD

Secure Digital

SDRAM

synchronous dynamic RAM

SFF

small form-factor

SIM

Systems Insight Manager

SNMP

Simple Network Management Protocol

SPI

system peripheral interface

SSD

support software diskette

TMRA

recommended ambient operating temperature

TPM

trusted platform module

UID

unit identification

UPS

uninterruptible power system

USB

universal serial bus

VCA

Version Control Agent

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